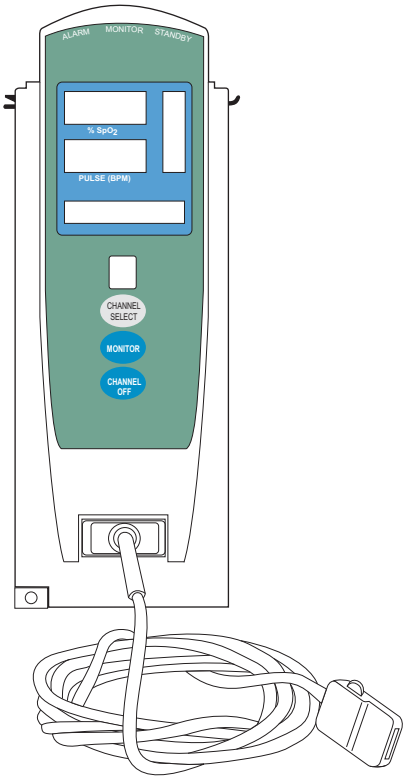
Technical Service Manual

Alaris® SpO_2 Modules

8210 Series (Nellcor® Technology)
8220 Series (Masimo® Technology)

Supports: Guardrails® Suite (v7)
Guardrails® Suite MX (v8)
December 2010



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Alaris® Products

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Chapter 1 – GENERAL INFORMATION

CAUTION

To **avoid damaging the keypad**, do not use sharp objects (such as, pens, pencils) to activate switches.

CAUTION

Any attempt to service this product by anyone other than an authorized CareFusion Service Representative, while the product is under warranty, **may invalidate the warranty**.

1.1 INTRODUCTION

This manual describes how to service the SpO_2 Modules (8210 and 8220 Series). It is used in conjunction with the following Alaris® System documents and software:

- PC Unit / Pump Module (8000/8100 Series) Technical Service Manual
- Alaris® System Directions for Use (DFU)
- Maintenance Software and User Manual (v8.1 or later)

This manual is intended for personnel experienced in analysis, troubleshooting and repair of analog/digital microprocessor-based electronic equipment.

Reference the Alaris® System DFU for a product introduction, detailed setup and operation procedures, definitions (including precaution definitions), specifications, and other information related to the use of the Alaris® System.

If the SpO_2 Module requires service while under warranty, it must be serviced only by CareFusion authorized service personnel. Reference the "Warranty" and "Service Information" sections in the Alaris® System DFU.

1.2 FEATURES

- Functional blood oxygen saturation percentage, pulse rate, pulse bar, channel identification and scrolling messages display (such as, alerts and alarms).
- Alarm limit settings, trend data and plethysmographic waveforms display.
- **8210 Series:** SatSeconds alarm Management Technology, to allow monitoring of $\%SpO_2$ below selected low alarm limit for a period of time before an audible alarm sounds.

1.2 FEATURES (Continued)

- **8220 Series:** Signal Extraction Technology® (SET®) for accurate readings under extreme conditions (such as, low perfusion and motion).

Reference the Alaris® System DFU for a list of features and definitions.

Table 1-1. Defined Terms

The following table identifies the defined terms used throughout this document for certain trademarked products and product features.

Product / Feature	Defined Term
Alaris® PC point-of-care unit	PC Unit
Alaris® PC unit	PC Unit
Alaris® Pump module	Pump Module
Alaris® SpO_2 module	SpO_2 Module
Guardrails® data set	Data Set

1.3 ALARMS AND MESSAGES

Alarm messages are displayed on the scrolling Message Display bar. Reference the Alaris® System DFU for detailed information.

An audio alarm and the Alarm Status Indicator flash red when an alarm limit is met or exceeded. All alarms can be temporarily silenced by pressing the **SILENCE** key on the PC Unit.

Chapter 2 – CHECKOUT AND CONFIGURATION

CAUTION

Should an instrument be **dropped or severely jarred**, remove it from use immediately. It should be thoroughly tested and inspected by qualified service personnel to ensure proper function prior to reuse.

2.1 INTRODUCTION

This chapter describes initial SpO_2 Module setup and configuration. Due to product changes over time, configurations described in this chapter may differ from the instrument being serviced.

2.2 NEW INSTRUMENT CHECKOUT

Prior to placing a new instrument in use, perform a check-in procedure using the Maintenance Software.

When powering up the instrument, verify the instrument beeps and all display LED segments flash. This confirms that the instrument has performed its self test and is operating correctly. During operation, the instrument continually performs a self test, and alarms and displays a message if it detects an internal malfunction.

Contact CareFusion authorized service personnel if the instrument has physical damage, fails to satisfactorily pass the startup sequence, fails a self test, or continues to alarm.

2.3 CONFIGURATION OPTIONS AND SETUP - GENERAL

Reference the Alaris® System DFU for the following information:

- System Settings
- SpO_2 Module Settings

2.3.1 Configuration Notes

- Changes to factory default values are retained after a power cycle.
- If **Factory Default** is **Yes**, then all configuration settings are set to their factory default.

2.3 CONFIGURATION OPTIONS AND SETUP - GENERAL (Continued)

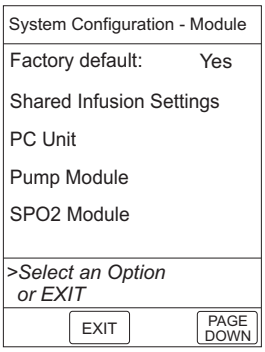
2.3.1 Configuration Notes (Continued)

- If **Factory Default** is **No**, then one or more of the configuration settings has been changed. If desired, **Factory Default** can be selected and set to **Yes**, which will set all configuration settings to their factory default.

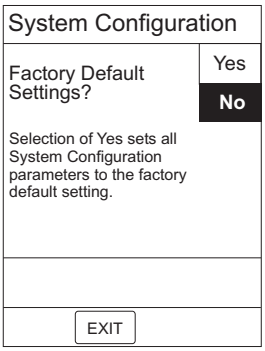
2.3.2 Factory Default Setting

To allow changes to be made to System Configuration parameters:

1. Hold **OPTIONS** key at power up.



2. Press **Factory default** soft key.
3. Press **No** soft key.



4. To accept change, press **EXIT** soft key.

2.3.3 Configuration Setup Notes

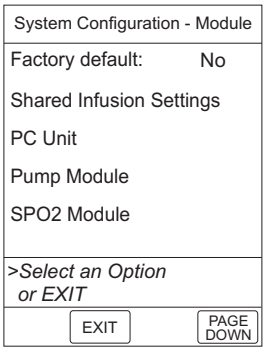
- Pressing **EXIT** soft key while in a **System Configuration - Module** screen immediately powers system down, with no "Powering Down" display.
- Pressing **EXIT** soft key while in a **System Config - SPO2** screen returns display to main **System Configuration - Module** screen.
- Pressing **CONFIRM** soft key while in a System Configuration option screen:
  - accepts existing setting or setting change
  - displays next option setting screen (if applicable) or returns display to **System Config - SPO2** screen
- Pressing PC Unit's **CANCEL** key while in a System Configuration option screen:
  - leaves setting unchanged
  - returns display to **System Config - SPO2** screen

2.4 CONFIGURATION SETUP

To change an option setting, ensure the **Factory default** setting is **No**.

2.4.1 Access System Configuration Options

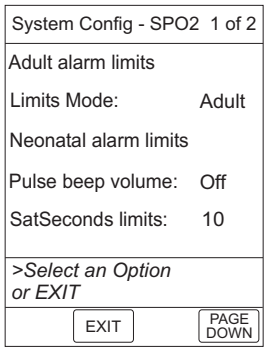
1. Hold **OPTIONS** key at power up.

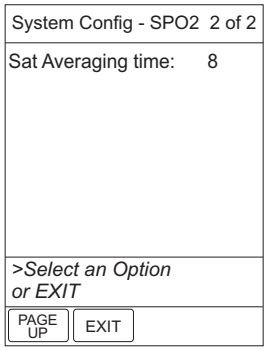


2.4 CONFIGURATION SETUP (Continued)

2.4.1 Access System Configuration Options (Continued)

2. Press **SPO2 Module** soft key. To view additional options, press **PAGE DOWN** soft key.

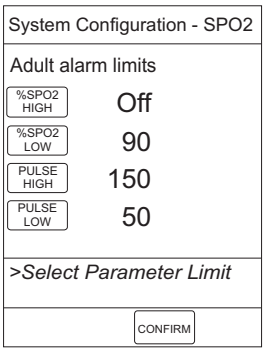




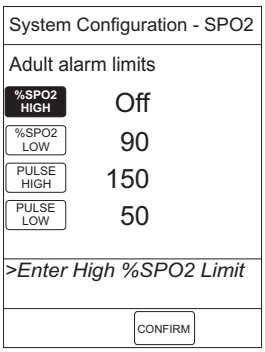
2.4.2 Alarm Limits

The following displays represent the **Adult alarm limits** but the same procedure is used for configuring the **Neonatal alarm limits**.

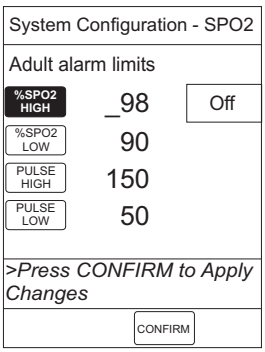
1. After accessing **System Config - SPO2** options display, press **Adult alarm limits** or **Neonatal alarm limits** soft key.



2. To change an alarm limit, press soft key next to parameter to be changed.



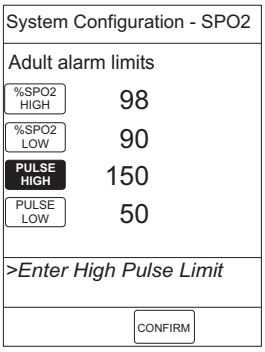
3. Enter a numeric value for selected alarm limit. **Adult %SPO2 HIGH** limit can be **Off** or a numeric value. Numeric values can be entered using keypad or ⌃ and ⌄ keys. Prompt changes to **>Press ENTER to CONFIRM** after a valid value has been highlighted for 3 seconds.



2.4 CONFIGURATION SETUP (Continued)

2.4.2 Alarm Limits (Continued)

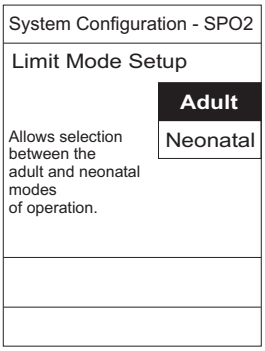
4. To accept change, press **ENTER** key.
   - Display highlights next limit and prompts for an entry.
5. To change another alarm limit, press soft key for that parameter and make necessary change.



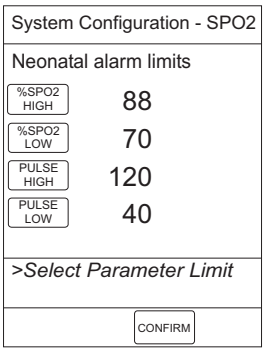
6. To accept change(s), press **CONFIRM** soft key.

2.4.3 Limit Mode

1. After accessing **System Config - SPO2** options display, press **Limits Mode** soft key.
   - Limit Mode cannot be changed if a Profile is being used for programming.



2. Select **Adult** or **Neonatal** by pressing applicable soft key.
   - Following display represents **Neonatal alarm limits** but same procedure is used for configuring **Adult alarm limits.**



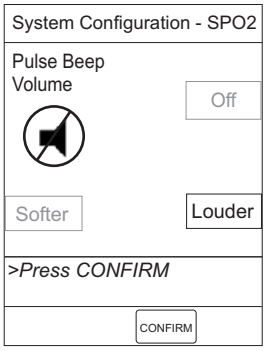
3. To change an alarm limit, see "Alarm Limits" section.

   OR

   To accept settings, press **CONFIRM** soft key.

2.4.4 Pulse Beep Volume

1. After accessing **System Config - SPO2** options display, press **Pulse beep volume** soft key
   - Following display reflects that **Pulse Beep Volume** is **Off**. To display volume options, press **Louder** soft key.

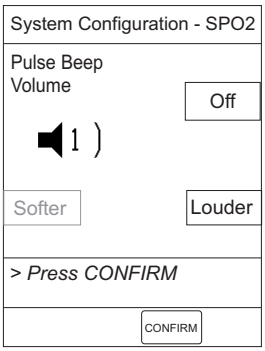


2.4 CONFIGURATION SETUP (Continued)

2.4.4 Pulse Beep Volume (Continued)

2. To increase volume, press **Louder** soft key until desired volume level is attained. To turn off pulse beep entirely, press **Off** soft key.

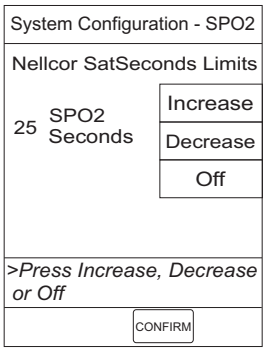
   - Selectable volume levels are **1**, **2** and **3**. Audio sounds for 1 cycle.



3. To accept setting, press **CONFIRM** soft key.

2.4.5 SatSeconds Limits (8210 Series)

1. After accessing **System Config - SPO2** options display, press **SatSeconds limits** soft key.



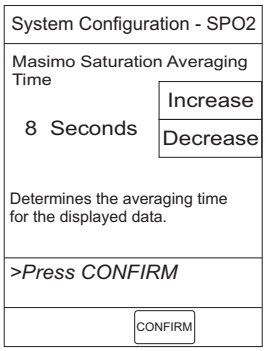
2. To change **SatSeconds Limits**, press either **Increase** or **Decrease** soft key. To turn off **SatSeconds Limits**, press **Off** soft key.

   - Selectable options are **Off**, or **10**, **25**, **50** and **100** seconds.

3. To accept settings, press **CONFIRM** soft key.

2.4.6 Saturation Averaging Time (8220 Series)

1. After accessing **System Config - SPO2** options display, page 2, press **Sat. Averaging time** soft key.



2. To change **Saturation Averaging Time**, press either **Increase** or **Decrease** soft key.

   - Selectable options are **2**, **4**, **8**, **10**, **12**, **14** and **16** seconds. **Fast sat** is enabled when **2** or **4** seconds is selected.

3. To accept settings, press **CONFIRM** soft key.

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Chapter 3 – PREVENTIVE MAINTENANCE

WARNING

Failure to perform regular and preventive maintenance inspections may result in improper instrument operation.

3.1 INTRODUCTION

Perform regular and preventive maintenance inspections to ensure that the SpO_2 Module remains in good operating condition:

- Perform regular inspections before each use.
- Perform preventive maintenance inspections once a year.

Use the Maintenance Software to perform calibration and preventive maintenance.

These requirements and guidelines are intended to complement the intent of the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) requirements.

3.2 CLEANING

Reference the Alaris® System DFU.

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Chapter 4 – PRINCIPLES OF OPERATION

4.1 INTRODUCTION

This chapter describes the SpO_2 Module principles of operation.

Reference the PC Unit / Pump Module (8000/8100 Series) Technical Service Manual for Alaris® System principles of operation.

4.2 GENERAL INFORMATION

SpO_2 Module operation is based on the principles of pulse oximetry. Oxyhemoglobin and deoxyhemoglobin differ in their absorption of red and infrared light (spectrophotometry). The volume of arterial blood in tissue and the light absorbed by the blood changes during the pulse (plethysmography).

Because oxyhemoglobin and deoxyhemoglobin differ in light absorption, the amount of red and infrared light absorbed by blood is related to hemoglobin oxygen saturation.

4.3 8210 Series (Nellcor Technology)

A pulse oximeter determines SpO_2 by passing red and infrared light into an arteriolar bed and measuring changes in light absorption during the pulsatile cycle. Red and infrared low-voltage light-emitting diodes (LED) in the oximetry sensor serve as light sources; a photo diode serves as the photo detector.

To identify the oxygen saturation of arterial hemoglobin, the monitor uses the pulsatile nature of arterial flow. During systole, a new pulse of arterial blood enters the vascular bed, and blood volume and light absorption increase. During diastole, blood volume and light absorption reach their lowest point. The SpO_2 Module bases its SpO_2 measurements on the difference between maximum and minimum absorption (measurements at systole and diastole).

4.3 8210 series (Nellcor Technology) (Continued)

By doing so, it focuses on light absorption by pulsatile arterial blood, eliminating the effects of nonpulsatile absorbers (such as, venous blood, tissue and bone).

Because light absorption by hemoglobin is wavelength dependent and the mean wavelength of LEDs varies, an oximeter must know the mean wavelength of the sensor's red LED to accurately measure SpO_2. During monitoring, the instrument's software selects coefficients that are appropriate for the wavelength of that individual sensor's red LED. Those coefficients are then used to determine SpO_2.

To compensate for differences in tissue thickness, the light intensity of the sensor's LEDs is adjusted automatically.

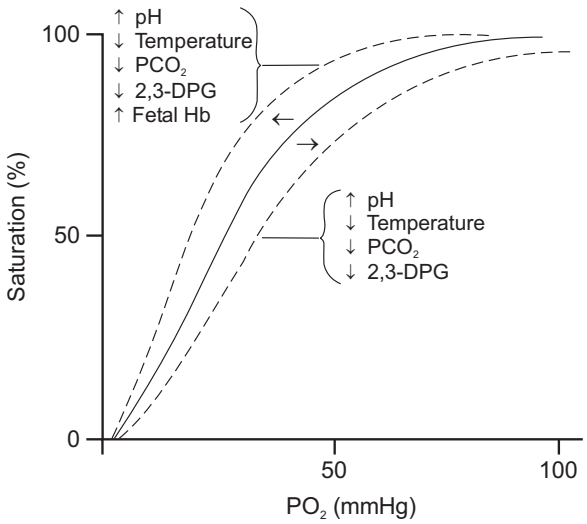
The SpO_2 Module measures functional saturation (oxygenated hemoglobin expressed as a percentage of the hemoglobin that can transport oxygen). It does not detect significant amounts of dysfunctional hemoglobin (such as, carboxyhemoglobin or methemoglobin). In contrast, hemoximeters (such as, IL482) report fractional saturation (oxygenated hemoglobin expressed as a percentage of all measured hemoglobin, including measured dysfunctional hemoglobin).

To compare functional saturation measurements to those from an instrument that measures fractional saturation, fractional measurements must be converted as follows:

$$\text{functional saturation} = \frac{\text{fractional saturation}}{100 - (\%\text{carboxyhemoglobin} + \%\text{methemoglobin})} \times 100$$

When saturation is calculated from a blood gas partial pressure of oxygen (PO_2), the calculated value may differ from the SpO_2 measurement of the SpO_2 Module. This usually occurs because the calculated saturation was not appropriately corrected for the effects of variables that shift the relationship between PO_2 and pH, temperature, the partial pressure of carbon dioxide (PCO_2), 2,3-DPG, and fetal hemoglobin. To compare functional saturation measurements to those from an instrument that measures fractional saturation, fractional measurements must be converted as follows:

Oxyhemoglobin Dissociation Curve



4.4 8220 Series (Masimo Technology)

The SpO_2 Module uses the Masimo® Signal Extraction Technology® (SET®) to decompose the red and infrared pulsatile absorbance signal into an arterial signal plus a noise component. Its value is used to find the SpO_2 saturation in an empirically derived equation in the Masimo® SET® software. The values in an internal look-up table are based on human blood studies against a laboratory co-oximeter on healthy adult volunteers in induced hypoxia states during motion and nonmotion conditions.

Chapter 5 – CORRECTIVE MAINTENANCE

WARNING

Disconnect the SpO_2 Module from the Alaris® System **prior to performing maintenance**. The instrument case should only be opened by qualified personnel using proper grounding techniques.

CAUTION

CMOS devices are sensitive to static electrical charges and may be damaged during repair if the repair activity is not performed in an electrostatic discharge (ESD) protected environment using approved ESD protective procedures, including personnel grounding.

5.1 INTRODUCTION

This chapter describes how to disassemble and reassemble the SpO_2 Module.

The circuit boards used in the SpO_2 Module are fitted with surface mount devices and are not field repairable. Return circuit boards to an authorized CareFusion Service Center for repair. Attempting circuit board repairs voids all warranties.

For replacement part information, see the "Illustrated Parts Breakdown" chapter. Following any level of maintenance, perform the applicable tests (see "Level of Testing Guidelines" table).

Due to product changes over time, components/assemblies illustrated in this chapter may differ from the instrument being serviced.

5.2 DISASSEMBLY / REASSEMBLY

To disassemble the instrument, follow the steps in order from the first step. To reassemble, perform the steps in their reverse order.

Before adhering gaskets and labels to the instrument, clean the surface with a cotton swab or soft cloth lightly dampened with 70% Isopropyl Alcohol.

CAUTION

To avoid the risk of an **electrical hazard or damage** to the instrument circuitry, do not spray fluids directly onto the instrument or allow fluids to enter the instrument.

Table 5-1. Required Materials, Supplies and Tools

NOTE: Contact/source information is subject to change.

- Silicone Grease, Dow Corning Molykote 33, or equivalent (http://www.dowcorning.com)
- #1 Phillips Screwdriver
- #2 Phillips Screwdriver
- Needle-Nose Pliers
- Small Diagonal Cutters
- Lint-free cloth (such as, Kimwipes or lint-free tissue)

5.2 DISASSEMBLY / REASSEMBLY (Continued)

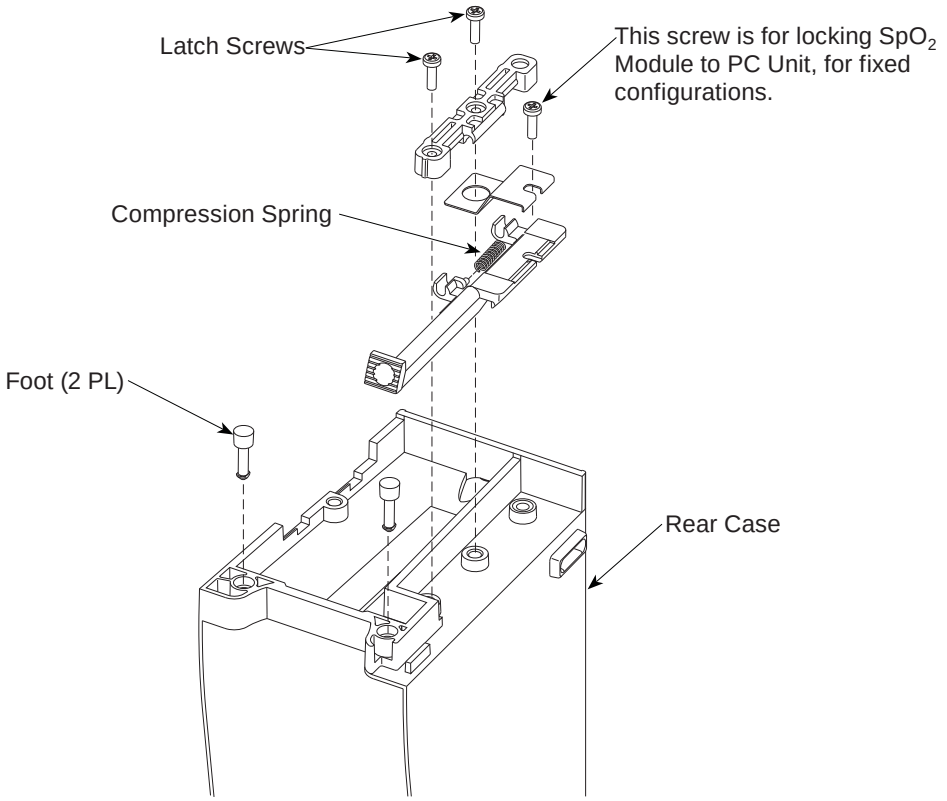
5.2.1 Removing Latch Assembly and Feet

1. Remove screws (2) attaching Latch Assembly to bottom of Rear Case.
2. Remove Latch Assembly components. Pay close attention to Compression Spring location, to ensure proper installation during reassembly.
3. Pull Feet (2) from underside of module.

During Reassembly:

Apply thin layer of Dow Corning Molykote 33 (or equivalent) silicone grease to Feet.

NOTE: The feet press-fit into the module.


Latch Screws
This screw is for locking SpO2 Module to PC Unit, for fixed configurations.
Compression Spring
Foot (2 PL)
Rear Case

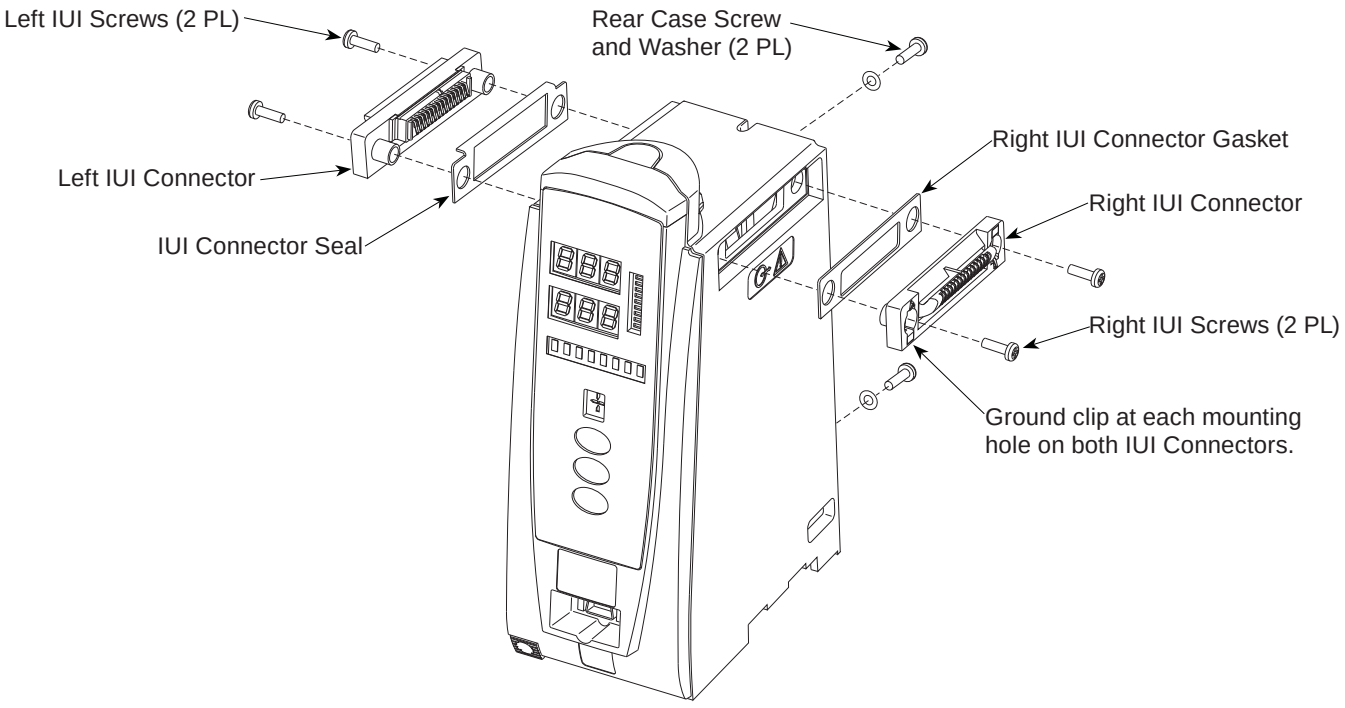
5.2 DISASSEMBLY / REASSEMBLY (Continued)

5.2.2 Removing IUI Connector Assemblies and Rear Case

1. Remove screws (2) attaching each IUI (left and right) to module.
2. Remove screws (2) and associated washers attaching Rear Case to module.
3. Separate Rear Case from Front Case by pulling Rear Case away from module.

During Reassembly:

- Ensure ground clips are still installed on both IUI connectors.
- To install Right IUI Connector Gasket, remove protective backing and adhere to IUI Connector.
- To install Left IUI Connector Seal, position seal on one end of connector and stretch to other end to conform to connector body. Gently press on seal to seat completely. Use lint-free swab to apply alcohol to top, sides, and bottom of seal for lubrication while installing to Rear Case. Do not apply alcohol to contacts or connector.
- Ensure Silicon Tubing in Rear Case is in place and not damaged. (See Figure 7–8)


Left IUI Screws (2 PL)
Rear Case Screw and Washer (2 PL)
Right IUI Connector Gasket
Left IUI Connector
Right IUI Connector
IUI Connector Seal
Right IUI Screws (2 PL)
Ground clip at each mounting hole on both IUI Connectors.

5.2 DISASSEMBLY / REASSEMBLY (Continued)

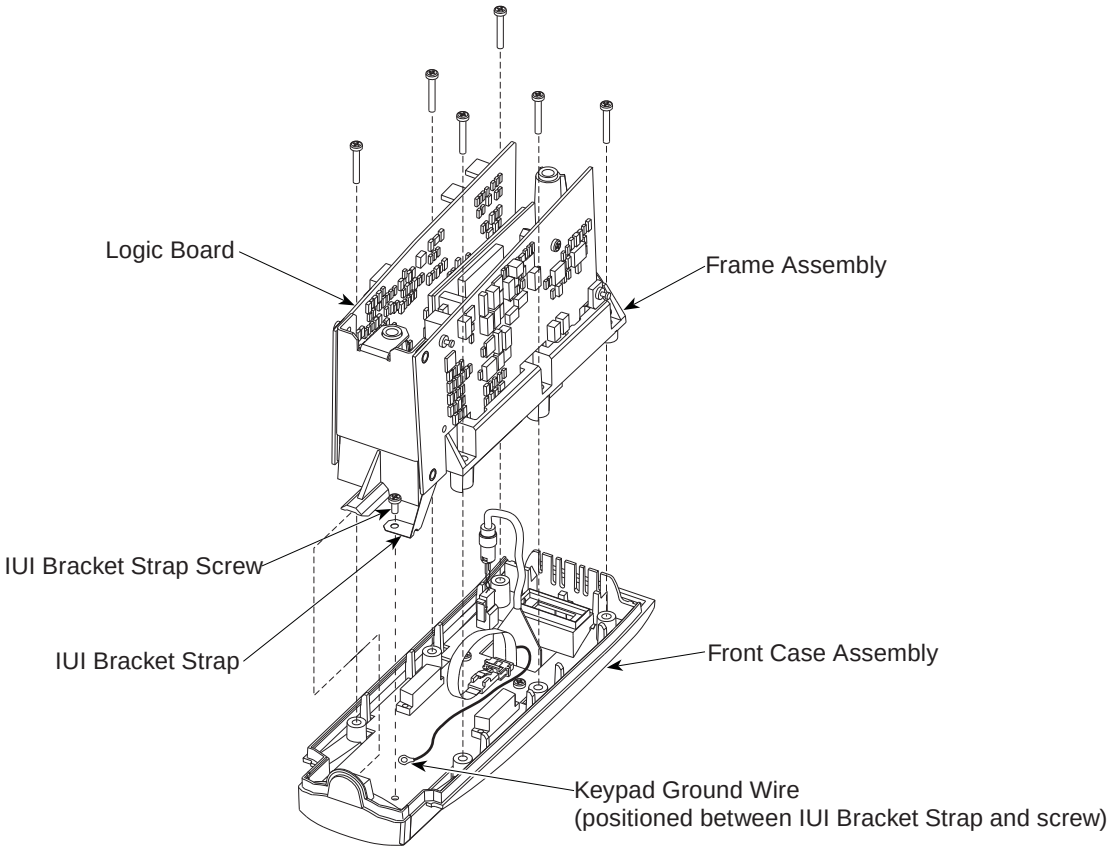
5.2.3 Removing Frame Assembly

1. Remove screws (6) attaching Frame Assembly to Front Case Assembly.
2. Remove IUI Bracket Strap screw.
3. Separate Frame Assembly from Front Case Assembly.

During Reassembly:

Align Frame and Front Case Assemblies as follows:

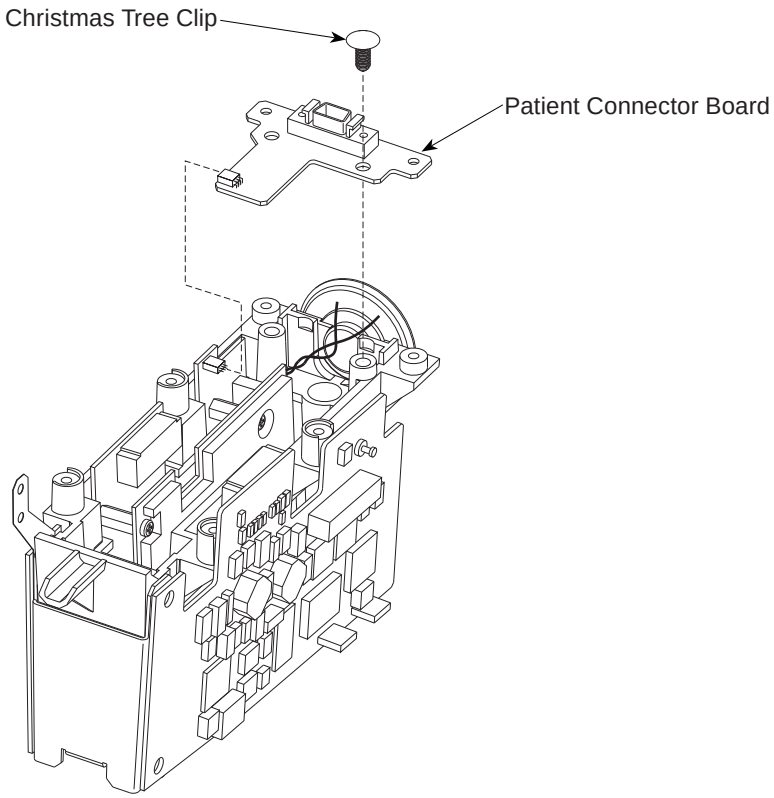
- Engage top flange of Frame with square slot on Status Indicator Lens.
- Align and engage display connectors (2) with Power Supply Board and Logic Board connectors.
- Ensure Patient Board connector is centered within square cutout on Front Case.
- Position Keypad Ground Wire between IUI Bracket Strap and screw.



5.2 DISASSEMBLY / REASSEMBLY (Continued)

5.2.4 Removing Patient Connector Board Assembly

1. Use needle nose pliers to remove Christmas Tree Clip securing Patient Connector Board to Frame Assembly.
2. Disconnect Patient Connector Board from J4 on Power Supply Board.



5.2 DISASSEMBLY / REASSEMBLY (Continued)

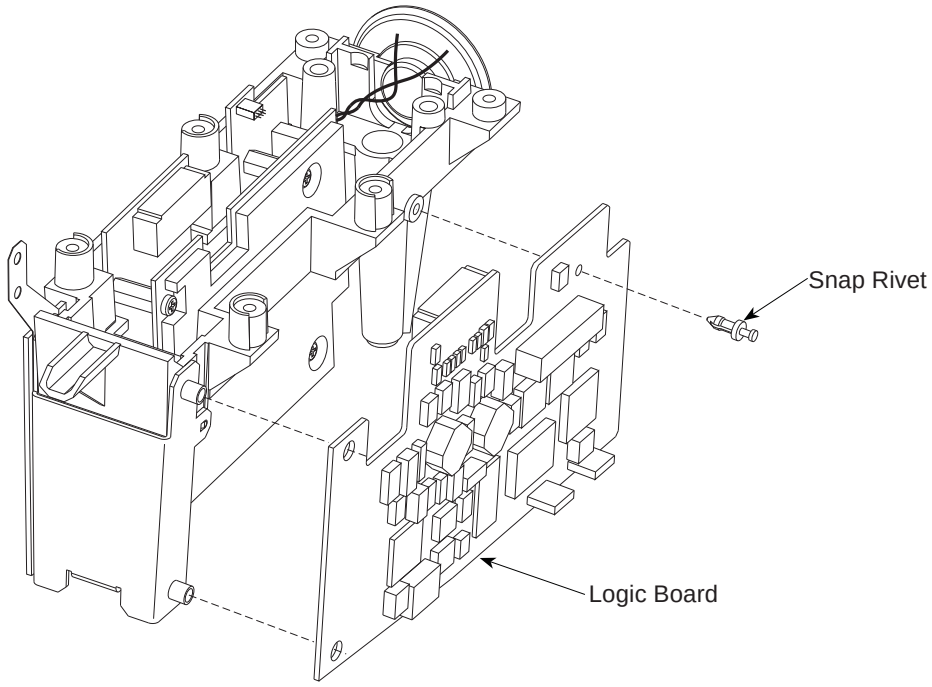
5.2.5 Removing Logic Board Assembly

1. Use small diagonal cutters to lift and remove Snap Rivet from Logic Board.

CAUTION

Do not cut rivet.

2. Remove Logic Board.



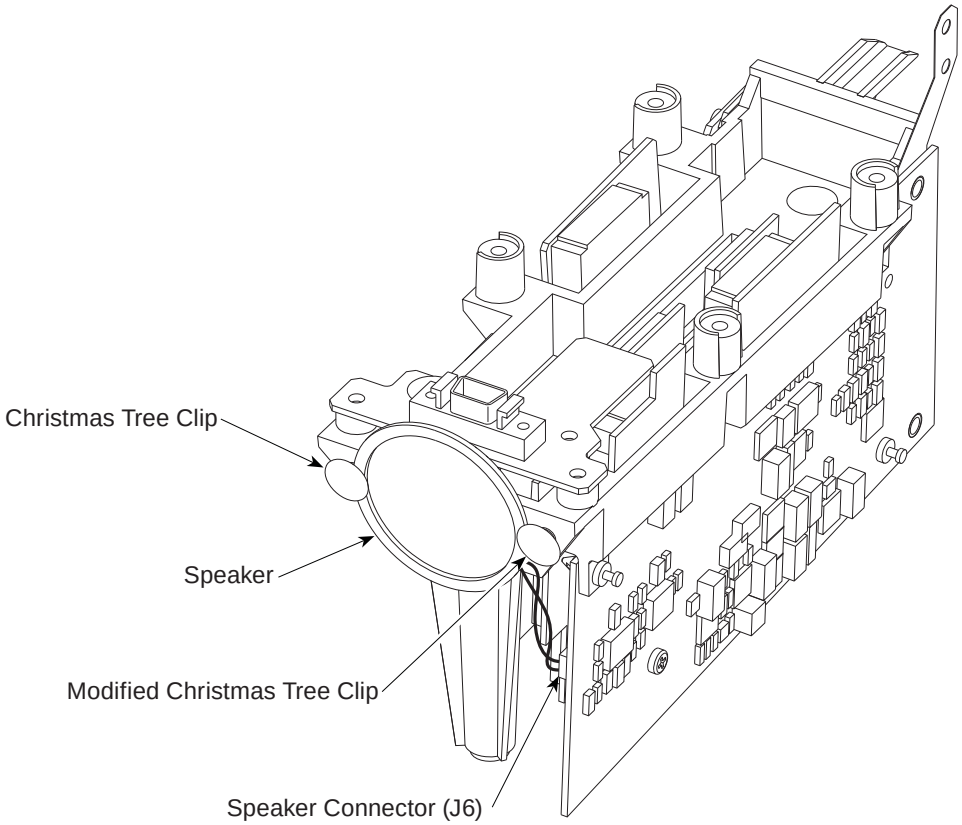
5.2 DISASSEMBLY / REASSEMBLY (Continued)

5.2.6 Removing Speaker

1. Disconnect Speaker Connector from J6 on Power Supply Board.
2. Use needle nose pliers to remove Christmas Tree Clips (2) attaching Speaker to Frame Assembly.
3. Remove Speaker.

During Reassembly:

- Bundle excess speaker wires together with a cable tie.
- Use modified Christmas Tree Clip (tip removed) in speaker mounting hole located near Power Supply Board.



5.2 DISASSEMBLY / REASSEMBLY (Continued)

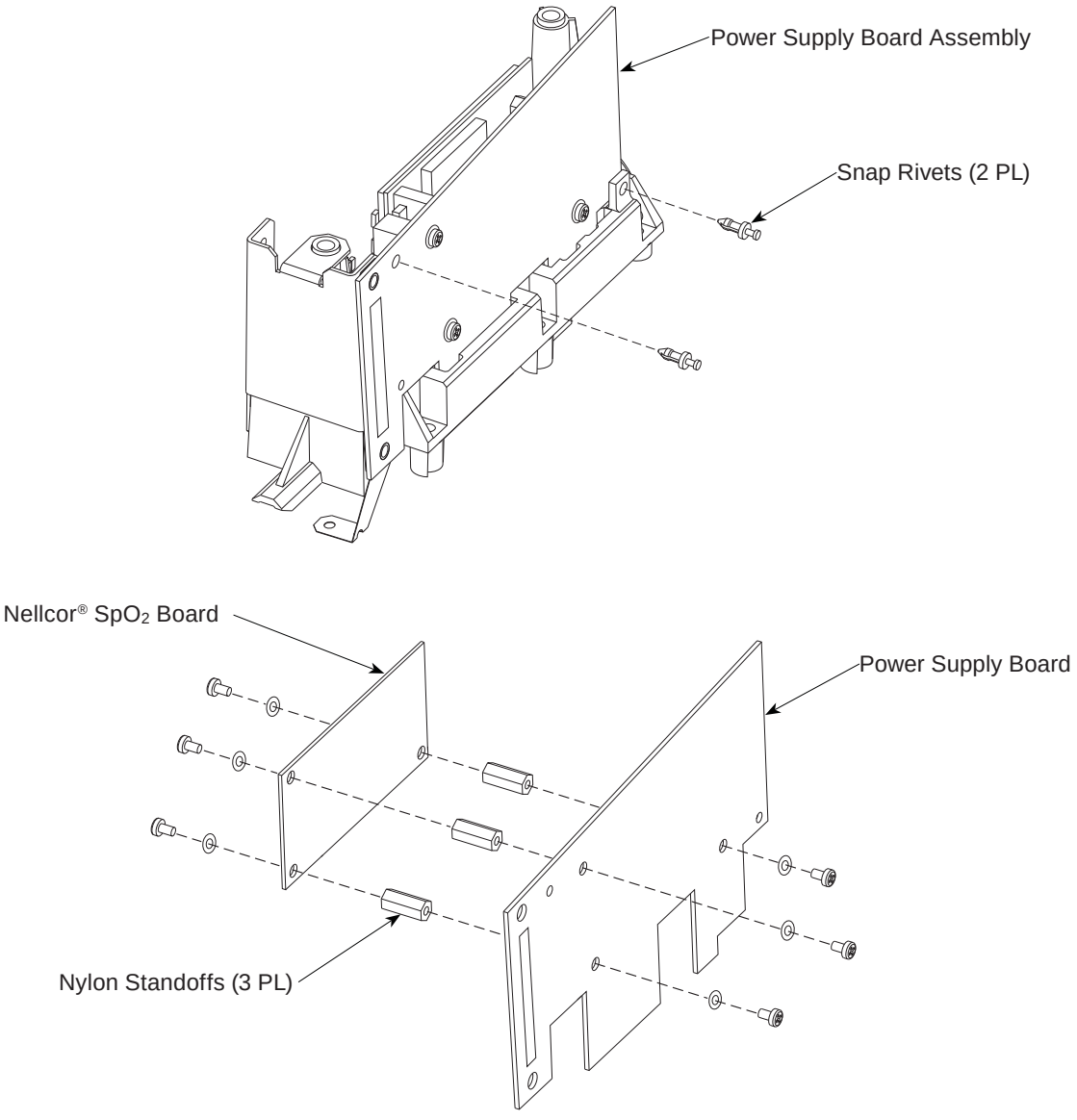
5.2.7 Removing Nellcor® SpO_2 Board and Power Supply Board Assemblies

1. Use small diagonal cutters to lift and remove Snap Rivets (2) from Power Supply Board.

CAUTION

Do not cut rivet.

2. Remove Board from Frame Assembly.
3. Remove screws (3) and associated washers, from either board, to separate board assemblies.



5.2 DISASSEMBLY / REASSEMBLY (Continued)

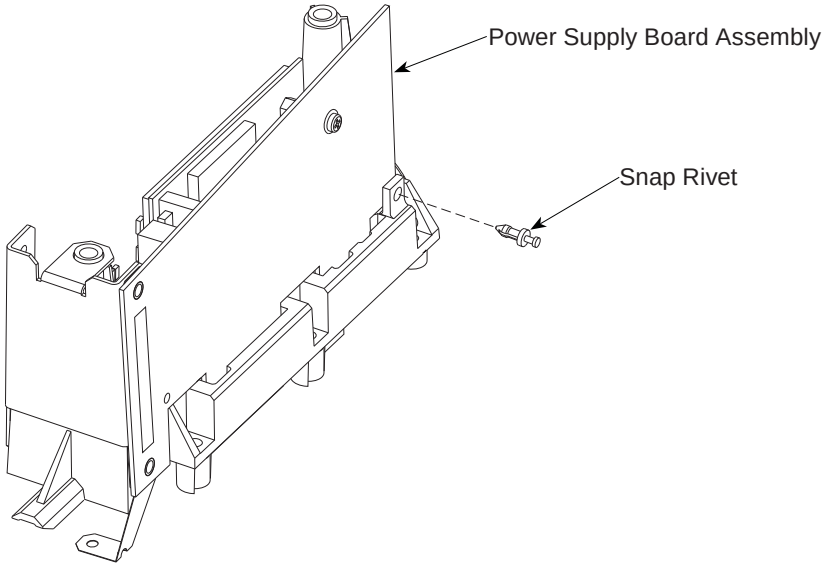
5.2.8 Removing Masimo® SpO_2 Board and Power Supply Board Assemblies

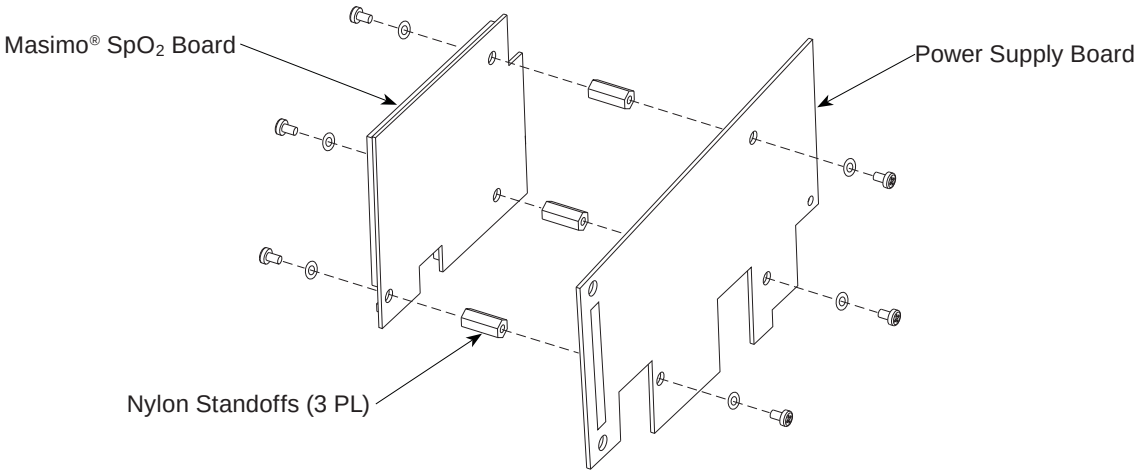
1. Use small diagonal cutters to lift and remove Snap Rivet (1) from Power Supply Board.

CAUTION

Do not cut rivet.

2. Remove Board from Frame Assembly.
3. Remove screws (3) and associated washers, from either board, to separate board assemblies.

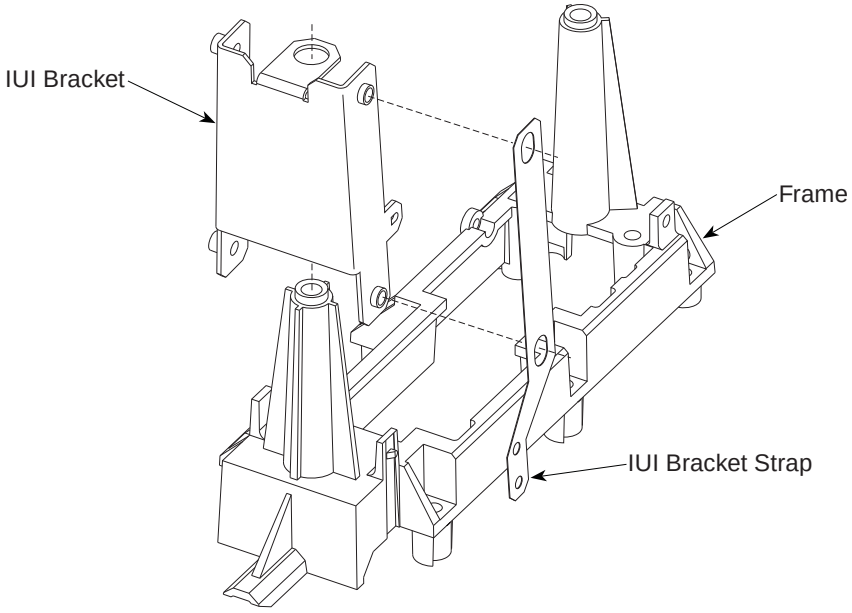




5.2 DISASSEMBLY / REASSEMBLY (Continued)

5.2.9 Removing IUI Bracket Strap and Bracket

1. Slide IUI Bracket Strap off IUI Bracket.
2. Slide IUI Bracket off Frame.



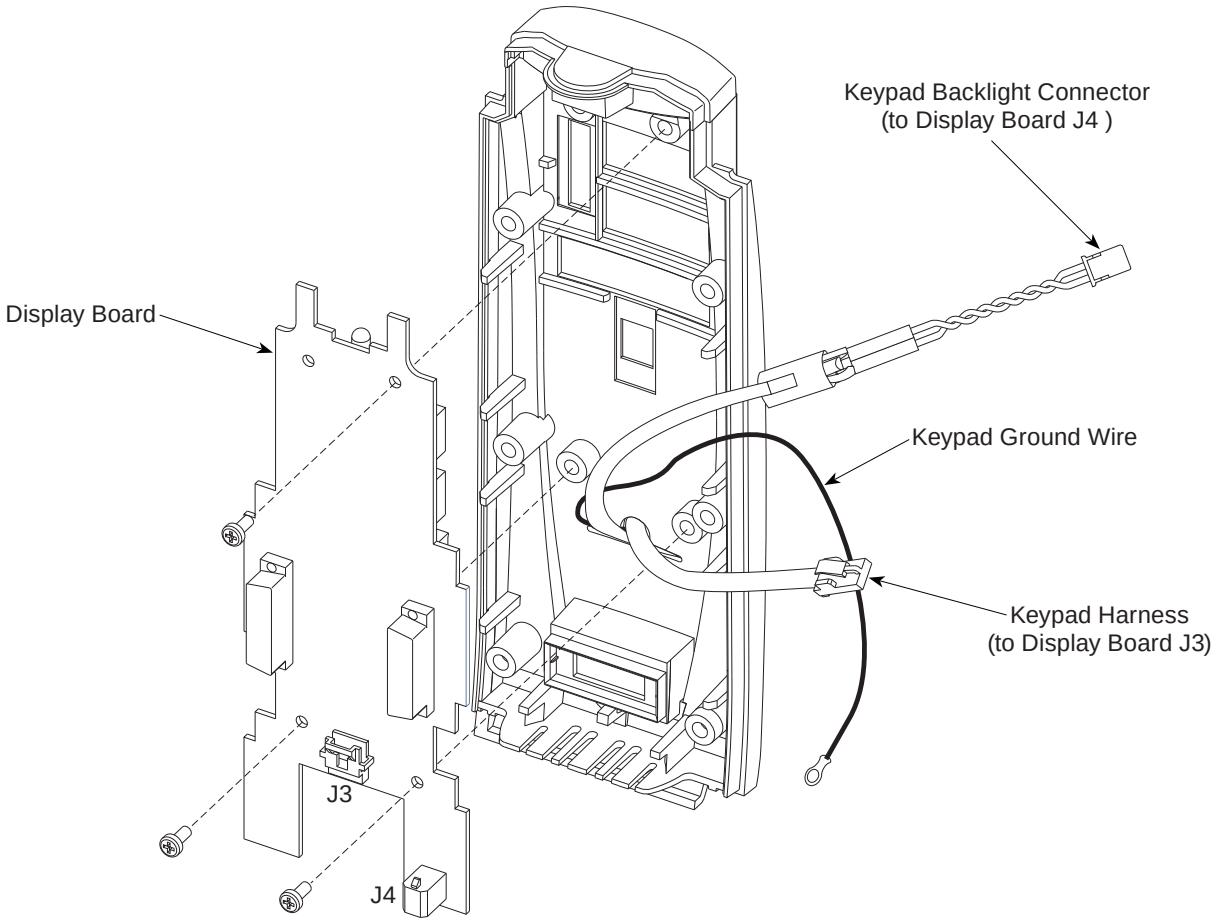
5.2 DISASSEMBLY / REASSEMBLY (Continued)

5.2.10 Removing Display Board Assembly

1. Remove screws (3) attaching Display Board to Front Case.
2. Remove cable tie and disconnect Keypad Harness and Backlight Harness from Display Board.
3. Remove Display Board.

During Reassembly:

Bundle Backlight Cable, Keypad Harness, and Ground Wire together with a cable tie.



5.2 DISASSEMBLY / REASSEMBLY (Continued)

5.2.11 Removing Status Indicator Lens

1. Remove screws (2) attaching Status Indicator Lens to Front Case.
2. Remove Status Indicator Lens.

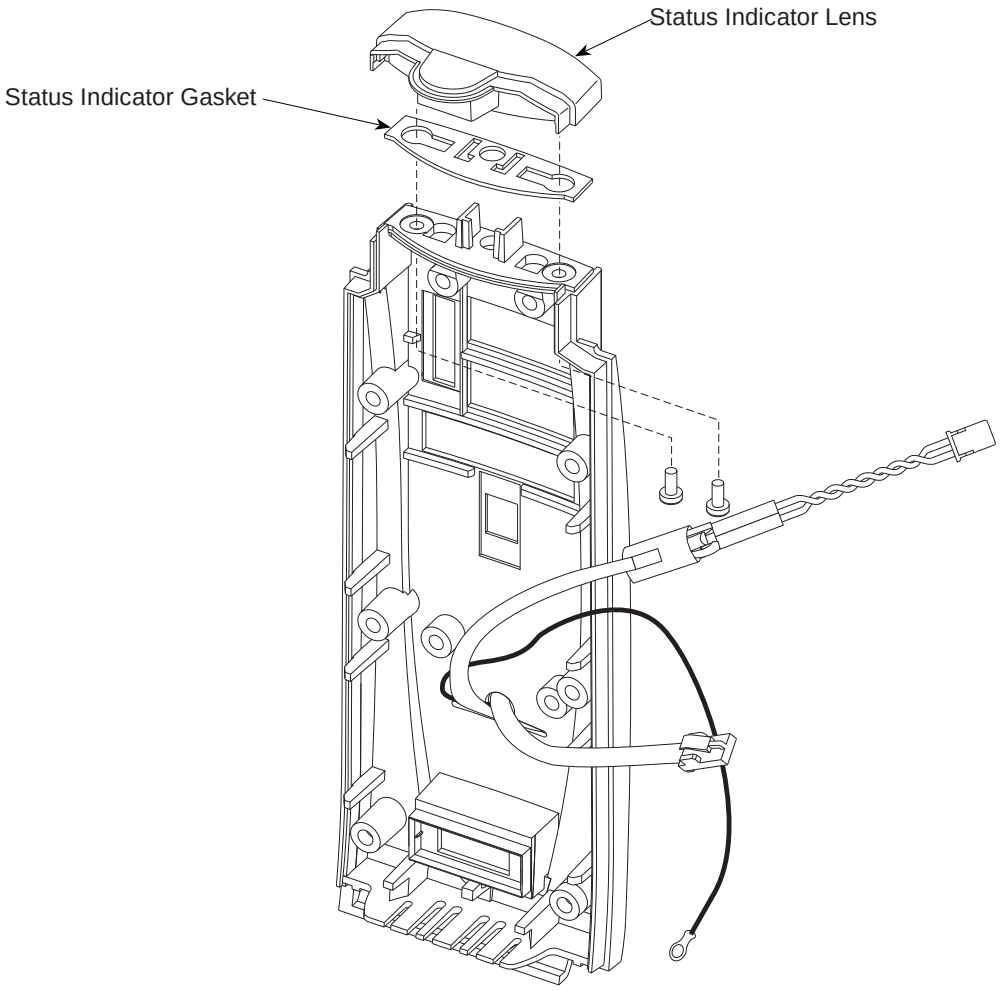


Table 5-2. Torque Values

Functional Application	Item Description	Torque Value
FINAL ASSEMBLY		
Case Halves	6-32 x 7/16	12 in-lb
IUI Connectors	6-32 x 7/16	12 in-lb
FRONT CASE		
Display Board Assembly	4-40 x 5/16	6 in-lb
Frame Assembly	4-40 x 3/4	6 in-lb
Status Indicator Lens	4-40 x 5/16	6 in-lb
INTERNAL SUPPORT FRAME		
IUI Bracket Strap and Ground Wire	4-40 x 5/16	6 in-lb
SpO_2 Board Assembly	6-32 x 7/16	6 in-lb
Power Supply Board Assembly	6-32 x 7/16	6 in-lb
REAR CASE		
Latch Assembly	4-40 x 5/16	6 in-lb

Table 5-3. Level of Testing Guidelines

Use the Maintenance Software to perform testing.

Tests to Perform → / I = Required, Blank = Not Applicable / Repair/Replacement of: ↓	Alarm Test	Channel ID / IUI Connector Test	Display Test	Keypad Test	Patient Cable Alarm Test	Patient Lead Electrical Leakage	Power On Self Test	Pulse Rate / Saturation Test	Speaker Test	Visual / Instrument Inspection
Display Board			I	I	I	I	I	I	I	I
Front Case / Keypad				I						I
Logic Board		I	I	I	I	I	I	I	I	I
SpO_2 Board							I	I		I
Patient Connector Board					I					I
Power Supply Board	I	I			I	I	I	I		I
Rear Case / IUI Connector		I								I
Miscellaneous: ↓										
Instrument Dropped	I	I	I	I	I	I	I	I	I	I
New Instrument Checkout	I	I	I	I						I
No Fault Found (instrument not opened)	I	I	I	I	I	I	I	I	I	I
No Fault Found (instrument opened)	I	I	I	I	I	I	I	I	I	I

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Chapter 6 – TROUBLESHOOTING

6.1 INTRODUCTION

The SpO_2 Module alarms and displays an error message and/or error code when an operating malfunction occurs. Use the information in this chapter to help diagnose and correct technical problems. Use the Maintenance Software to perform applicable preventive maintenance, calibration, and verification procedures.

6.2 SUBSYSTEM CODES AND ERROR CODE MATRIX

Reference the PC Unit / Pump Module (8000/8100 Series) Technical Service Manual for Alaris® System information.

Table 6-1. Technical Troubleshooting Guide

Perform the steps in the order they are listed until the problem/fault is corrected. Before making a final diagnosis, visually inspect the SpO_2 Module for damage. Following repair, use the Maintenance Software to perform the required tests.

Problem	Remedy
Display Problem	1. Check cable connections. 2. Replace Display. 3. Replace Logic Board. 4. Return to factory.
Intermittent Operation	1. Check connections to Logic Board. 2. Replace Logic Board 3. Return to factory.
Instrument Malfunction	1. Turn instrument off and back on to see if problem clears. 2. Reference alarm history for fault detected, and Error Code Tables.
Key Stuck Alarm	1. Turn instrument off and back on to see if problem clears. 2. Replace keypad assembly. 3. Replace Logic Board. 4. Return to factory.
Will Not Turn On	1. Check fuses. 2. Replace Off-Line Switcher. 3. Replace Power Supply Board. 4. Check IUI Connectors. 5. Replace Front Case Assembly. 6. Return to factory.

Table 6-2. Error Codes

Reference the PC Unit / Pump Module (8000/8100 Series) Technical Service Manual for details on accessing the Maintenance Mode and viewing the Error Log.

Error Code	Subsystem	Explanation	Response
400	Logic Board	Logic Board failure.	Cycle power. If error repeats, replace Logic Board.
410	Keypad Decoder	Keyboard processor failure.	Cycle power. If error repeats, replace Display Board.
411	Keypad Decoder Communication	Communications failure with keyboard processor.	Cycle power. If error repeats, check inter-board connections. Cycle power. If error repeats, replace Display Board and/or connectors.
430	Keypad	Keypad failure.	Cycle power. If error repeats, replace front panel.
450	IUI	IUI communication failure.	Cycle power. If error repeats, check IUI connectors. Cycle power. If error repeats, replace IUI connectors.
460	Power Supply Board	Power Supply Board failure.	Cycle power. If error repeats, replace Power Supply Board.
470	SpO_2 Board	SpO_2 Board failure.	Cycle power. If error repeats, replace SpO_2 Board.
471	SpO_2 Board Communication	Communications failure with SpO_2 Board.	Cycle power. If error repeats, check inter-board connections. Cycle power. If error repeats, replace SpO_2 Board and/or connectors.
6200	SpO_2 Board	Failed "continuous built-in tests".	Cycle power. If error repeats, replace SpO_2 Board.
6210	SpO_2 Board	Communications error.	Cycle power. If error repeats, replace SpO_2 Board.
6220	SpO_2 Board	Configurations error.	Cycle power. If error repeats, replace SpO_2 Board.
6230	SpO_2 Board	Received value "out of range".	Replace Sensor. If error repeats, cycle power. If error still occurs, replace SpO_2 Board.
6240	SpO_2 Board	Missing sensor status.	Replace Sensor. If error repeats, cycle power. If error still occurs, replace SpO_2 Board.

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Chapter 7 – ILLUSTRATED PARTS BREAKDOWN

7.1 INTRODUCTION

The illustrated parts breakdown for the instrument is divided into major assemblies and individual parts.

7.2 ILLUSTRATIONS

The exploded views serve as visual aids for identifying the parts of each assembly. If a part/assembly is identified with an item number (appearing in a bubble), that number corresponds with the item number on the parts list. If a part/assembly is not identified with an item number, it is available only as part of a higher assembly or kit.

Due to product changes over time, components/assemblies illustrated in this chapter may differ from the instrument being serviced.

7.3 PARTS LIST

The parts list provides the following information for saleable parts and assemblies:

Item: This number corresponds with number in illustration.

Part Number: This is the Alaris® product number needed when placing an order.

When a part number is not provided, that part is either not sold by CareFusion, is provided as part of a kit or higher assembly, or can only be replaced/repaired by CareFusion authorized service personnel.

Description: Descriptive information that may be helpful when placing an order.

QTY: Total number of each item used.

7.4 ORDERING PARTS

Parts can be ordered by writing or calling CareFusion Customer Care (see "General Contact Information" at beginning of this manual). When requesting a part, provide the following information:

- Product name and model number (for example, SpO_2 Module, Model 8210).
- Instrument software version. Reference Alaris® System DFU for directions on how to view software version.
- Part number.
- Part description, as provided in parts list.
- For labels, specify required language.

Table 7-1. Parts List

NOTE: An "assembly" is a preassembled group of parts. A "kit" is a group of unassembled parts.

Item	Part Number	Description	QTY
015	146980-000	Gasket, Status Indicator	1
020		Front Case:	1
	147716-001	8210 Series	
	146976-000	8220 Series	
025	146978-000	Lens, Status Indicator	1
030	10011343	Keypad	1
032	144424-100	Backlight LED Assembly, Keypad	1
035	146646-103	Board Assembly, Display	1
036	320905	Standoff, 14 Hex x 0.750, 6-32 Nylon	3
037		Board Assembly, SpO_2:	1
	10014345	Nellcor® (8210 Series)	
	10013006	Masimo® (8220 Series)	
039		Board Assembly, Power Supply:	1
	147747-100	8210 Series	
	146970-102	8220 Series	
040	142833-000	IUI Bracket	1
045	146977-000	Frame	1
047	320906	Christmas Tree Clip	3
050	141117	Speaker	1
055	146637-106	Board Assembly, Logic	1
060	146992-001	IUI Bracket Strap	1
065	147767-100	Board Assembly, Patient Connector	1
070	☒	Silicone Grease, Dow Corning Molykote (or equivalent)	As Required
075	142794-000	Foot, Rubber	2
080	147093-100	Silicon Tubing (10 Ft) (This 10-foot length of tubing is enough for 6 SpO_2 Modules. See Figure 7-8.)	1
085	146365-000	Rear Case, Unshielded	1
086		Case Assembly Kit, Rear: (Consists of: Nameplate Label and items 75, 80, 85, 620, 638. All items are attached except item 638.)	1
	10014803	Nellcor® (8210 Series)	
	10014804	Masimo® (8220 Series)	

Table 7-1. Parts List (Continued)

Item	Part Number	Description	QTY
090	147080-100	Latch Kit (Consists of: Latch, Compression Spring, Leaf Spring, Support)	1
110	320871	Washer, Nylon	6
120	147077-100	IUI Connector Kit, Right (Consists of: Right IUI Connector, Right Gasket)	1
130	147078-100	IUI Connector Kit, Left (Consists of: Left IUI Connector, Left Seal)	1
620		Patent Label:	1
	10014353	8210 Series	
	147352-000	8220 Series	
630		Logo Label:	1
	147381-000	Masimo®	
	147755-000	Nellcor®	
631	147868-000	Defibrillation Rating Label	1
638	125569	Serial Number Replacement Label	1
800	320851	Screw, 4-40 x 5/16, PHH PNH	8
820	834031	Cable Tie, 4" Auto Feed	2
825	300348	Screw, 4-40 x ¾, PHH PNH	6
830	806112	Snap Rivet, 0.125 diameter, Black Nylon	2
835	320855	Screw, 6-32 x 7/16, PHH PNH	12
840	320908	Washer, Flat, Stainless Steel	2
		Patient Cable:	1
	320886	Masimo® 8 Ft	
	320930	Nellcor® 3 Meter	
		Directions for Use, English:	
		Alaris® System with Model 8000 PC Unit:	
	10014346	Electronic Copy	
	10014343	Printed Copy	
		Maintenance Software:	
	10013678	Version 7	
	10013025	Version 8	

 Not sold by CareFusion.

Figure 7-1. Front Case Assembly

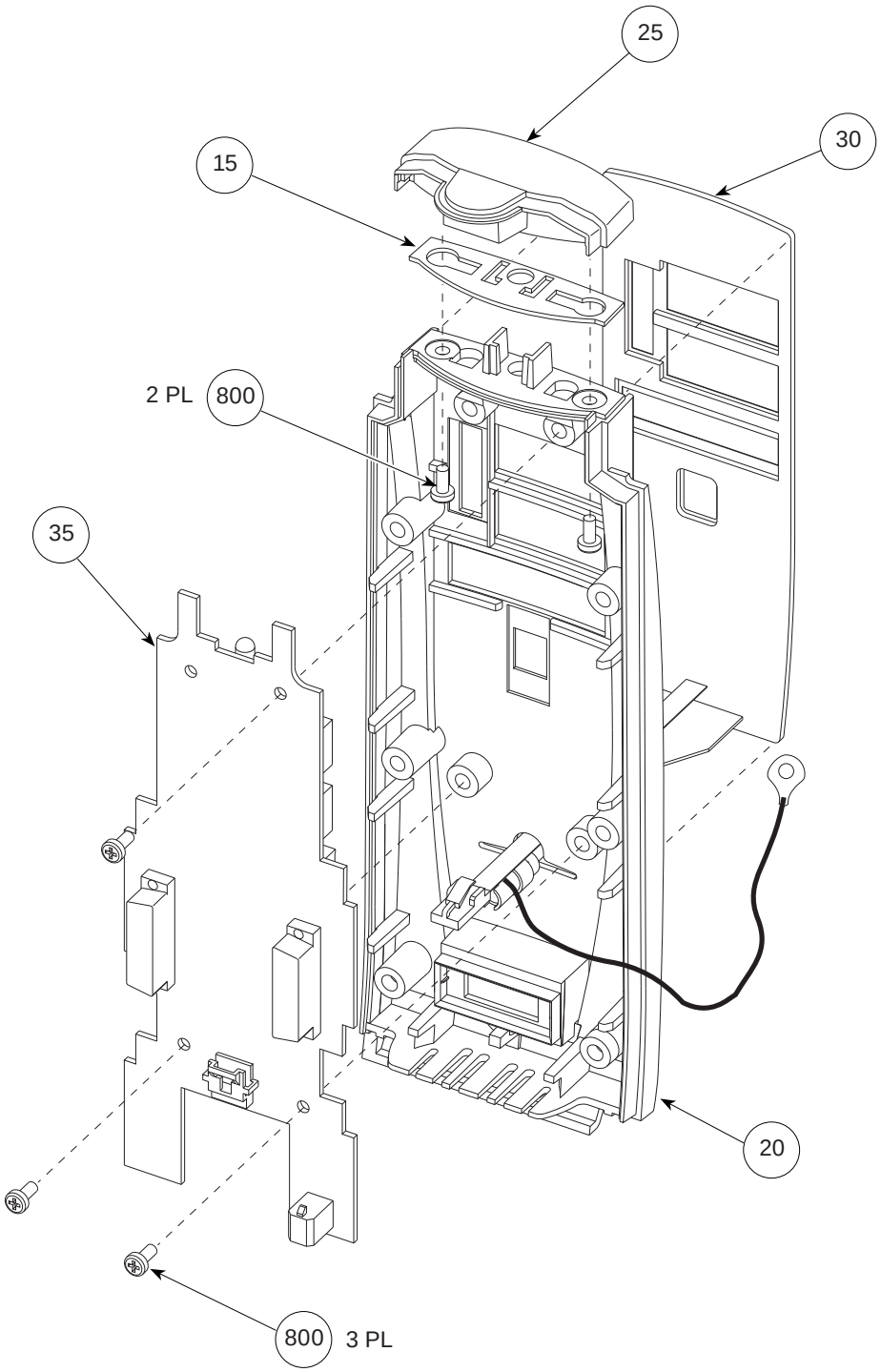


Figure 7-2. IUI Bracket/Frame

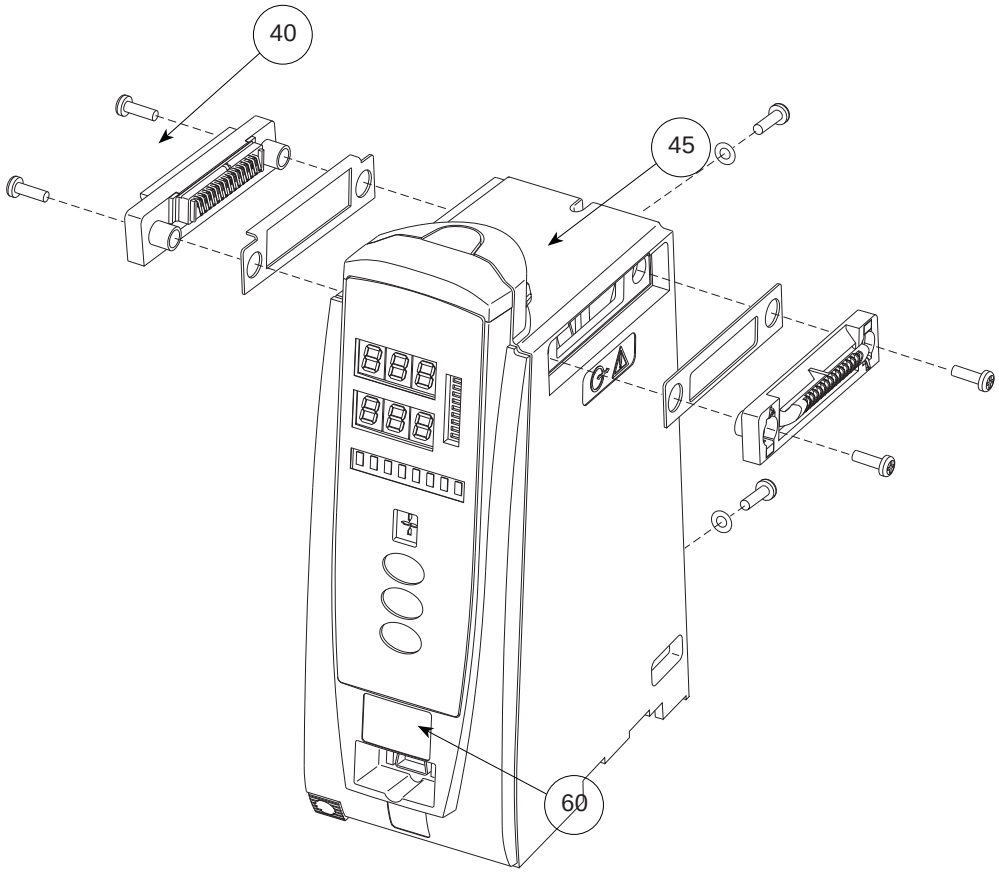


Figure 7-3. Masimo® SpO_2 Board - Power Supply Board Assembly

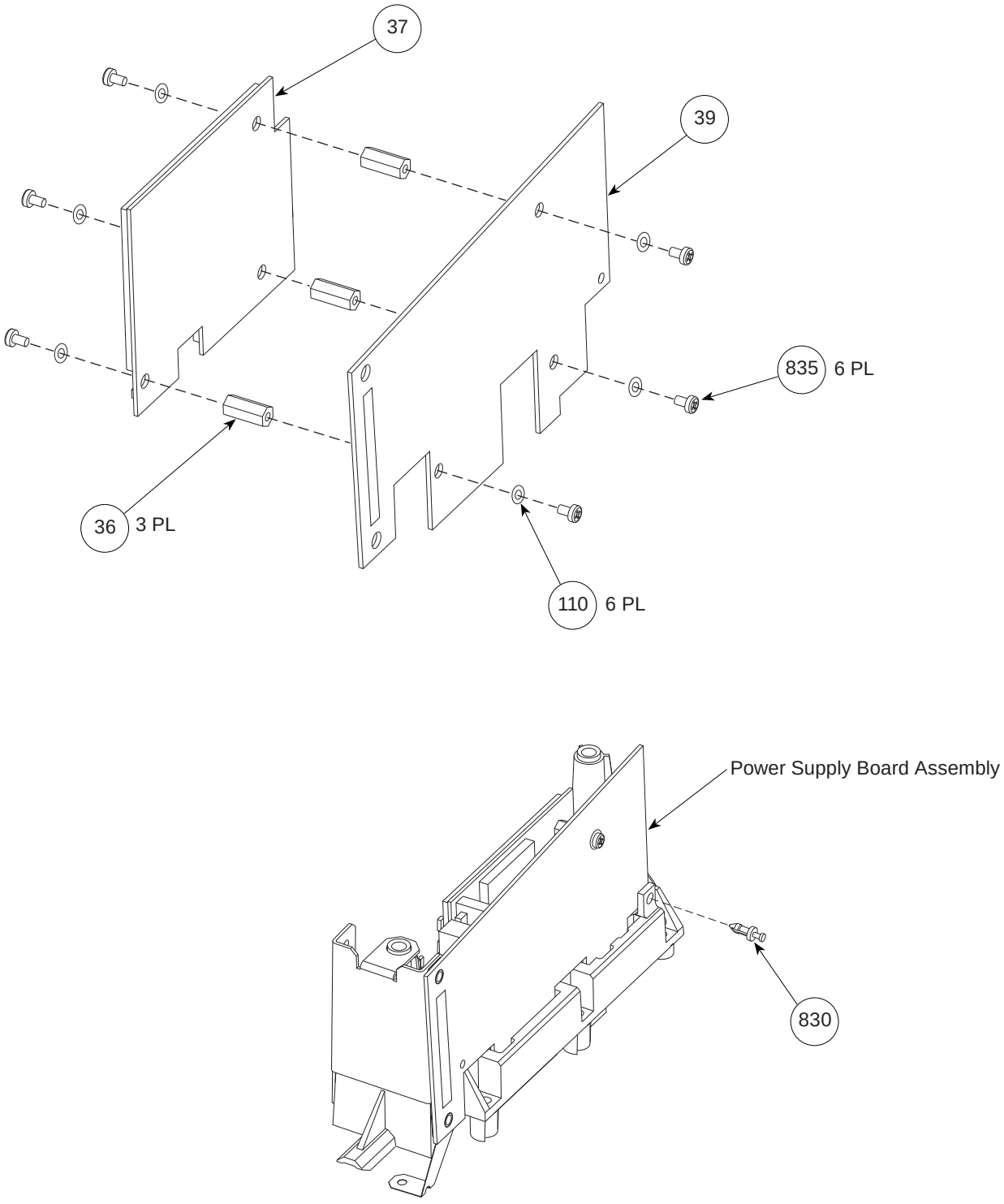


Figure 7-4. Nellcor® SpO_2 Board - Power Supply Board Assembly

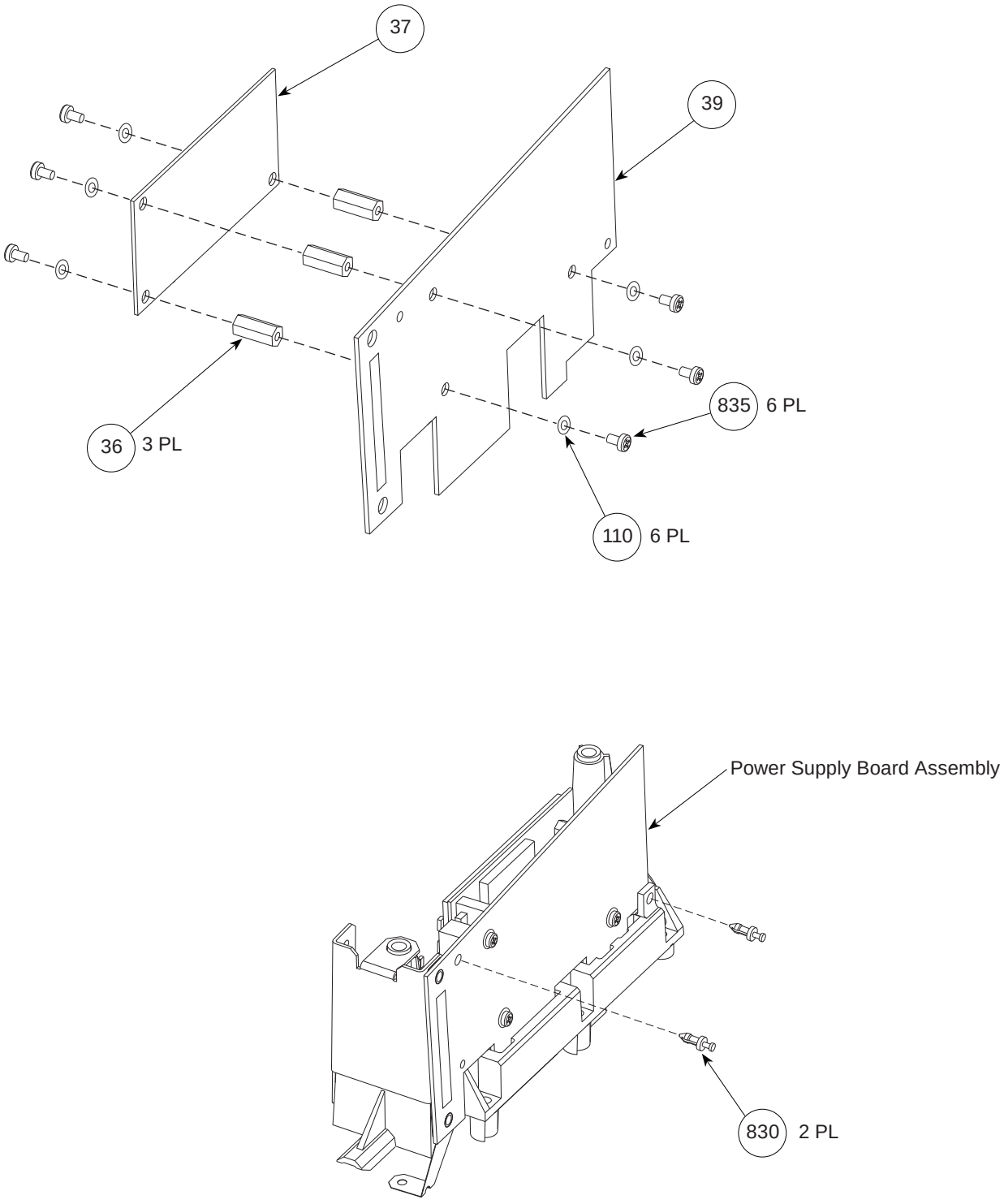


Figure 7-5. Frame Assembly - Logic Board View

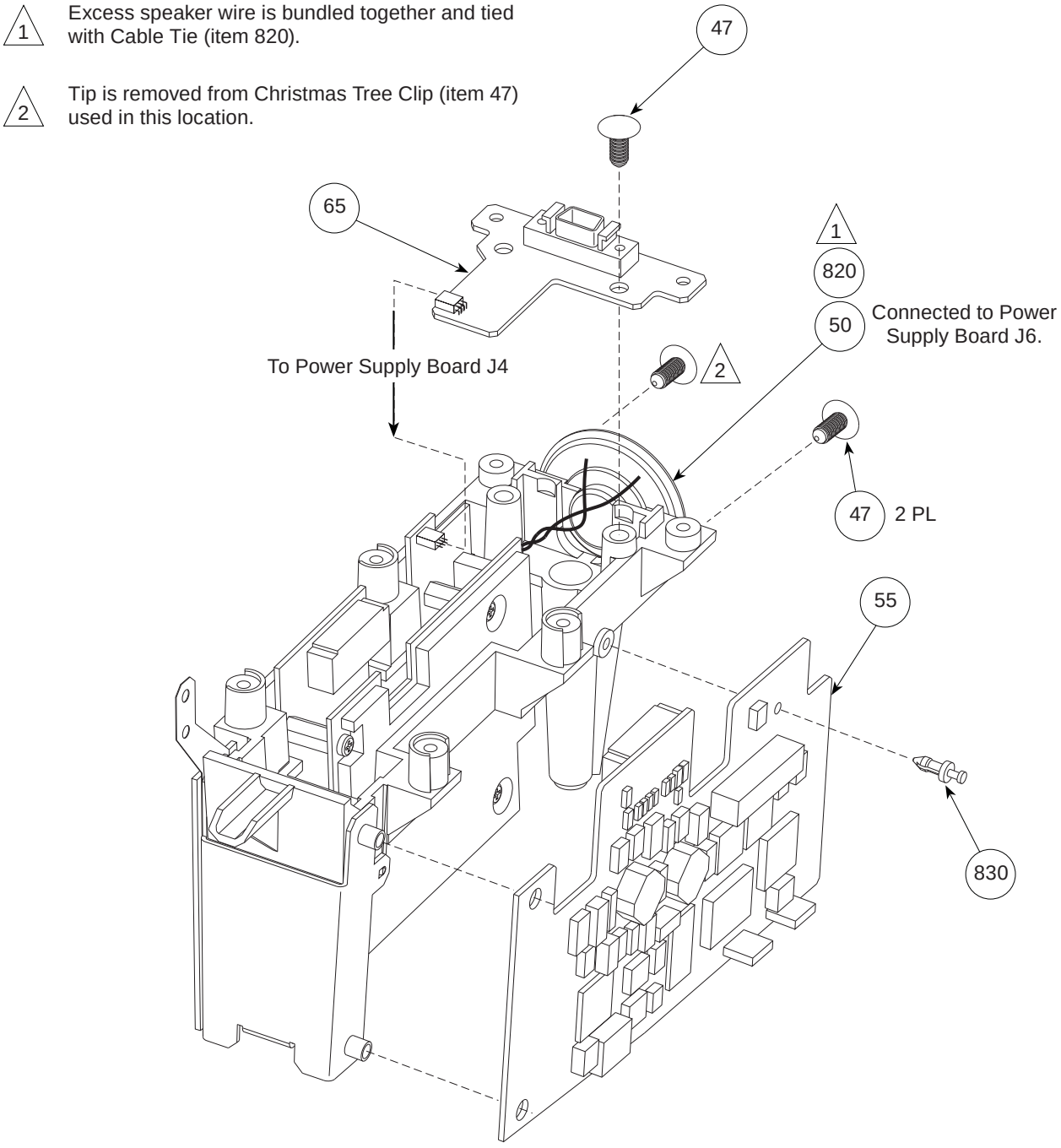


Figure 7-6. Frame - Front Case Assembly

1 LED Assembly Cable (item 32), harness, and ground wire are bundled together and loosely tied with one Cable Tie (item 820).

2 Ground wire is positioned between screw (item 800) and IUI Bracket Strap.

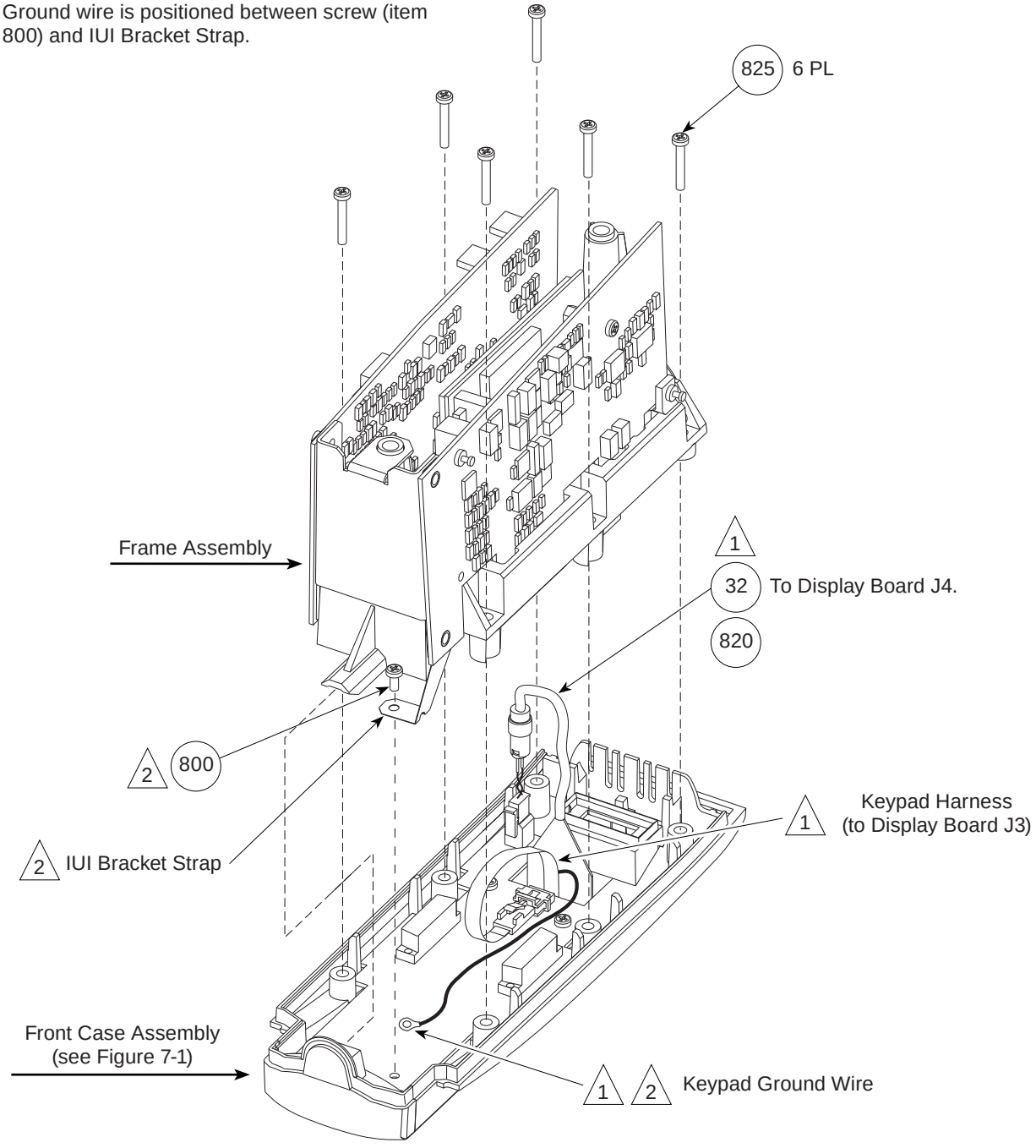


Figure 7-7. IUI Assembly

1 IUI Connector Kit, Right (item 120).

2 IUI Connector Kit, Left (item 130).

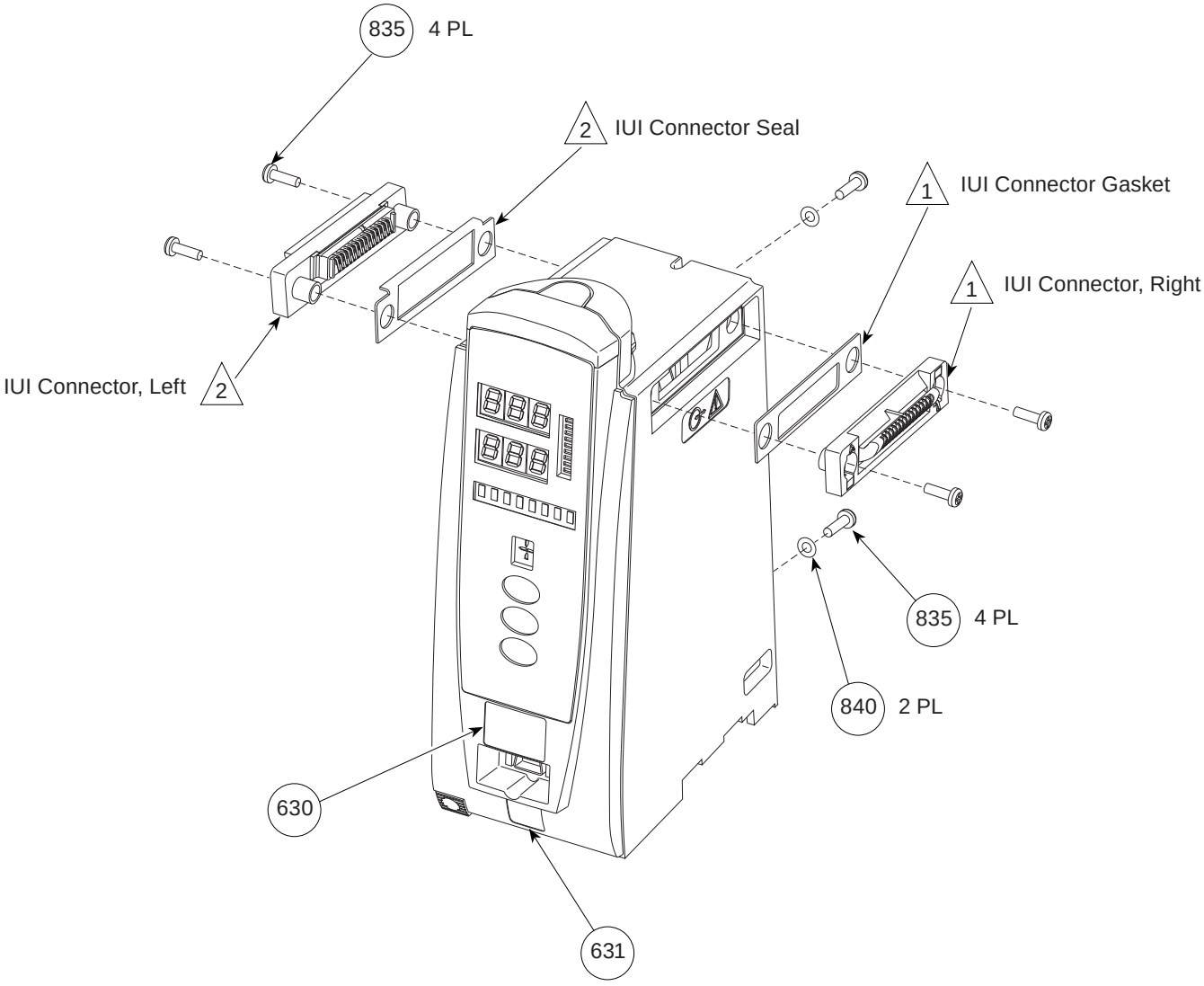


Figure 7-8. Rear Case Assembly

1 Latch Kit (item 90).

2 Rubber Feet (item 75), Rear Case (item 85), and Silicon Tubing (item 80) are provided as separate items and as part of Rear Case Assembly Kit (item 86).

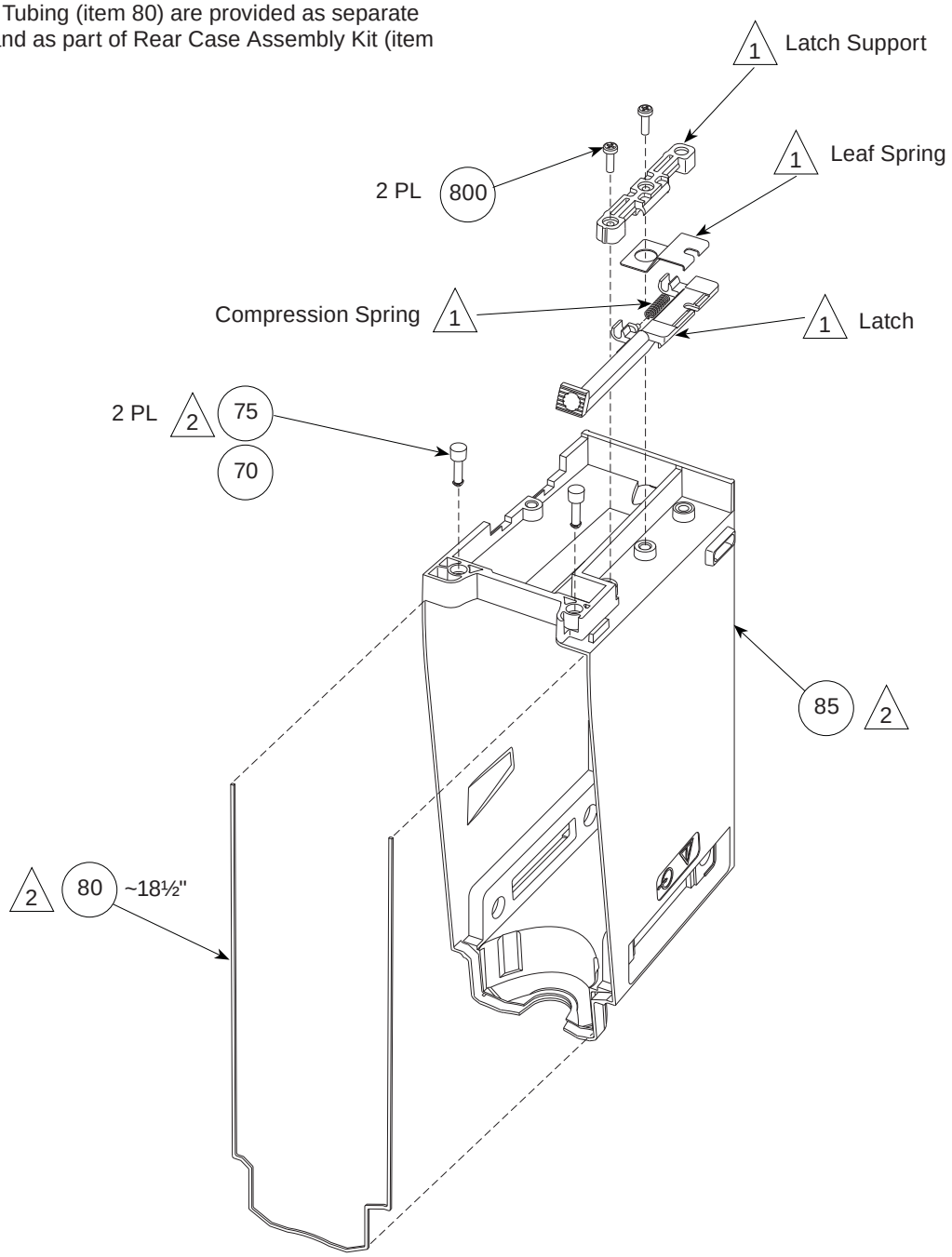


Figure 7-9. Rear Label Locations

△1 Nameplate Label, which has a regulatory mark, is not field replaceable as an individual item. It is available only as part of Rear Case Assembly Kit (item 86).

△2 Labels (items 620 and 638) are provided as separate items and as part of Rear Case Assembly Kit (item 86).

△3 Before adhering Serial Number Replacement Label (item 638):

1. Print instrument model and serial number on label with permanent black ink.
2. Apply clear overlay to completely cover label.

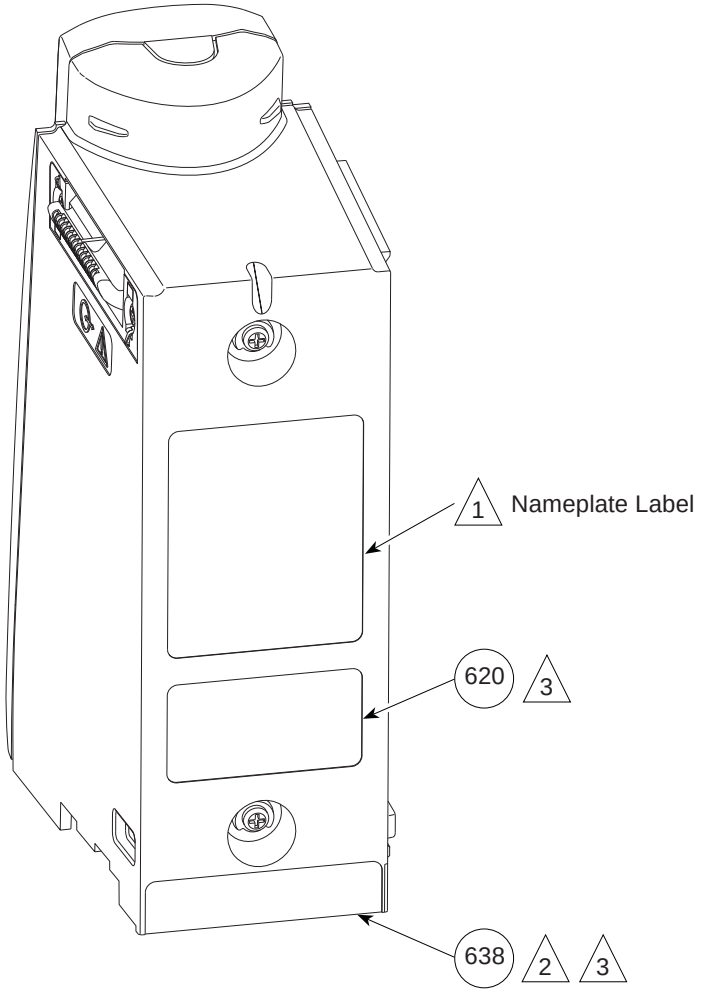


Figure 7-10. Display Board Assembly

This illustration is for board identification purposes only and does not represent the board's component layout.

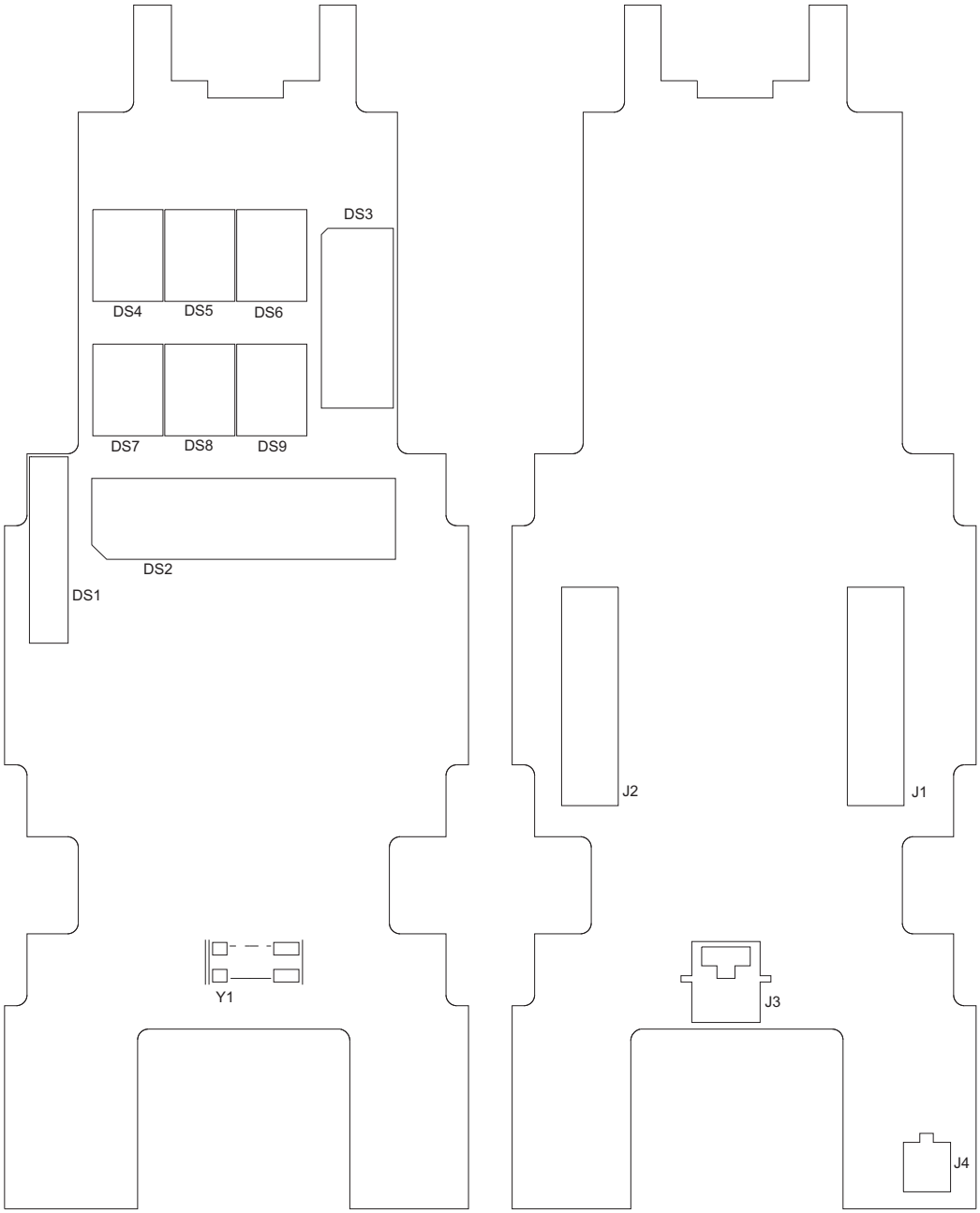


Figure 7-11. Logic Board Assembly

This illustration is for board identification purposes only and does not represent the board's component layout.

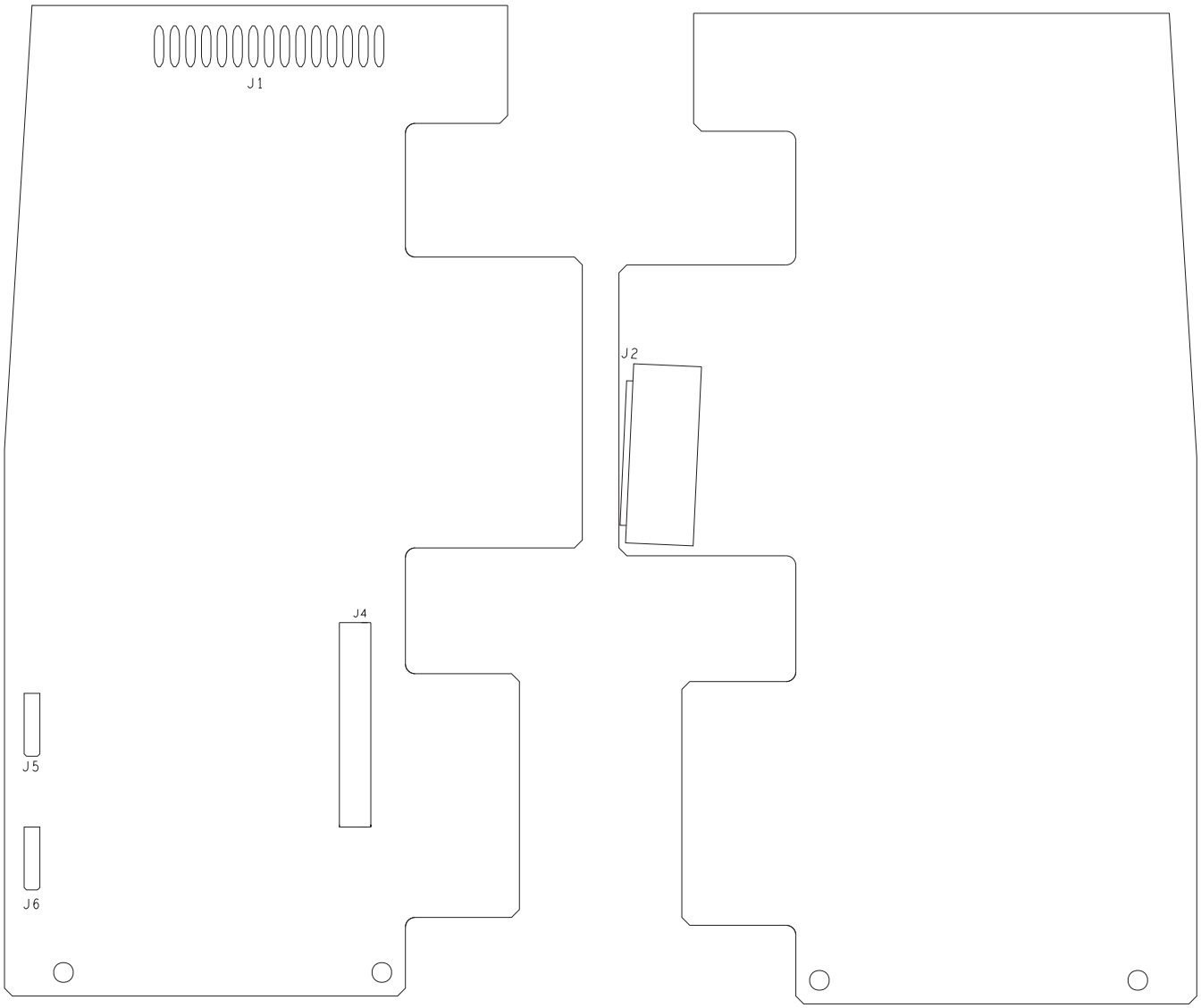


Figure 7-12. Power Supply Board Assembly (8210 Series)

This illustration is for board identification purposes only and does not represent the board's component layout.

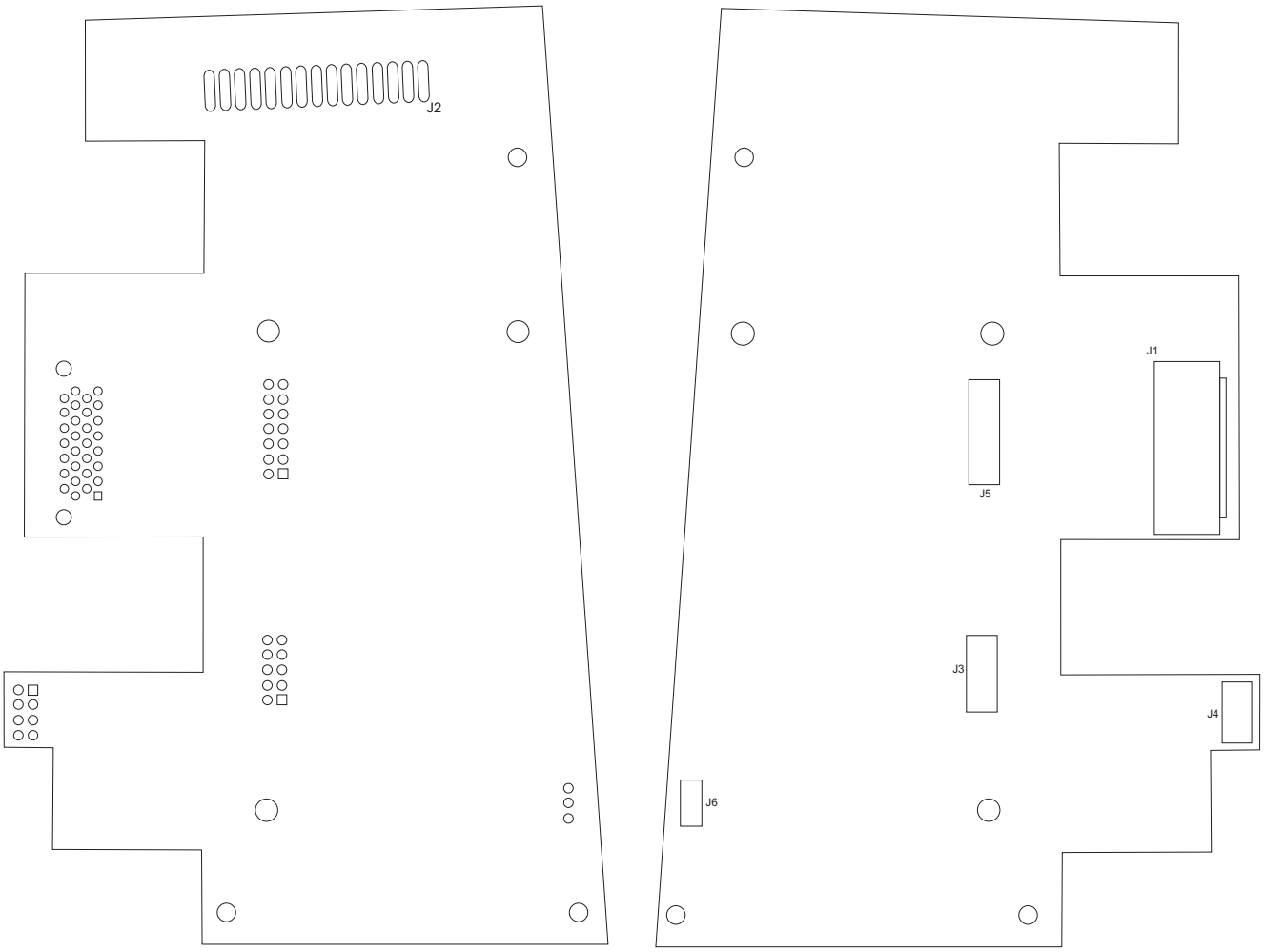
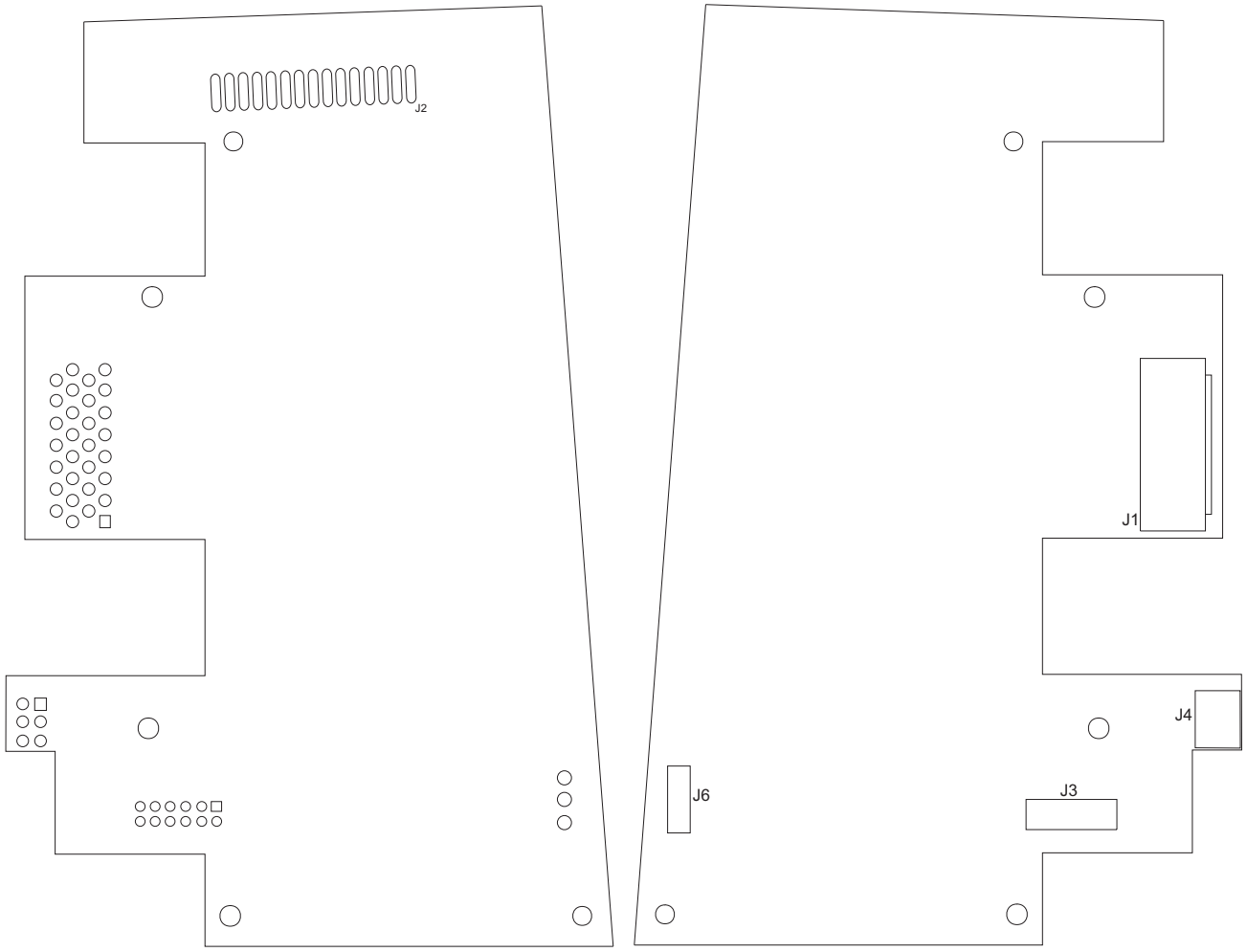


Figure 7-13. Power Supply Board Assembly (8220 Series)

This illustration is for board identification purposes only and does not represent the board's component layout.



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